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American Journal of Diseases of Children

VOLUME 30 JULY, 1925 NUMBER 1

THE HISTORY OF PEDIATRICS*

JOHN RUHRÄH, M.D.

BALTIMORE

The best sailors are those who have studied the charts and records of those who have sailed before; the best practitioners are those who have read widely. Osler used to say that to study the phenomena of disease without books is to sail an uncharted sea, while to read books without seeing patients is not to go to sea at all. Those accustomed to read only the newest publications often lack the healthy skepticism which comes from a familiarity with the older writers. To follow the ups and down in medicine is a fascinating occupation. An idea is born, lives a little while, enters a dormant period, to come to life again—often centuries later. The ignorant believe it is a new thought, but the well read know how many times before the same figment of the imagination has been exploited.

The history of pediatrics is like the history of medicine, and I am going to take you on a rapid aeroplane flight over the ages, to use an Oslerian expression. The remarkable history of the diseases of children by Garrison, published in Abt's "Pediatrics," gives the best account with which I am familiar. To supplement this I have collected and reprinted many of the early and rare contributions in a volume entitled "Pediatrics of the Past." There are not many other studies, but among the most important are the monograph of von Bókay, the chapter by Hennig in Gerhardt's "Handbuch," that by Brüning in Brüning and Schwalbe's "Handbuch," the history of infantile hygiene by Auvard and Pingat, and the history of infant feeding from Elizabethan times by Forsyth. Add to these a few other papers and addresses, and the field has been covered. Two presidential addresses read before this society have related to the history of pediatrics. In 1897, S. S. Adams chose for his subject "The Evolution of American Pediatrics," and in 1901 William D. Booker spoke on "The Early History of the Summer Diarrheas of Infants." Abraham Jacobi must also be mentioned among those who have contributed to this subject.

* Received for publication, May 9, 1925.

* President's address, read before the thirty-seventh annual meeting of the American Pediatric Society, Washington, D. C., May 4, 1925.

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ANCIENT PEDIATRIC LITERATURE

Payne has rightly called the present era the age of the child. In former centuries there was little care taken to prevent infant mortality, and for the most part the diseases of the young were neglected. In some places and ages, physicians were paid less for treating slaves than freemen and nothing for looking after children. Garrison gives a delightful summary of the early pediatric lore. A small section of the Ebers papyrus and a few other items represent Egypt; some of the code of Hammurabi and the Babylonian birth omens, some knowledge of dietetics, of massage and of a few diseases came from Babylonia and Assyria, while the first real contributions are in the works of the Brahmins—Susruta (second century, B.C.), Charaka (first century, A.D.) and Vagbhata (seventh century, A.D.). In these there are many charms, prayers and incantations, but there are also directions for the feeding and care of children as well as some description of diseases.

Greece.—The sacred writings of Israel contain not infrequent references to children, but it is not until we come to Greece and to the writings of Hippocrates that we find anything of lasting value. The descriptions of the epidemic of mumps, of convulsions, and the aphorisms relating to children are as true today as when they were written. As Garrison states: "With Hippocrates, Greek pediatrics, in the proper sense of the term, culminates and ends."

Roman Empire.—Rome now absorbed what was known as the world. Celsus is the only Roman who contributed anything of importance to pediatrics, and he is outshone by the Greek physicians who practiced in the Roman empire. Aretaeus, the Cappadocian, who lived in the second century, probably approached more nearly to the Hippocratic ideal than any except Soranus of Ephesus, with whom he had much in common. Both were clear thinkers, keen observers and masters of clinical description; both were good diagnosticians, and both went their way with little reference to the opinion or the work of others. Aretaeus left vivid pictures of many diseases—of diphtheria, empyema and pneumonia. Max Wellman believes that Aretaeus derived much from Archigenes of Apamea, who may be included among the early pediatric writers. Soranus was a medical reformer and one of the first advocates of infant welfare. He is strikingly modern, and he confined himself largely to real facts. He is credited with being the first to describe the nail test for milk. He foreshadowed the present day gland therapy when he recommended the dugs of goats and sheep which had suckled their young as a diet to increase the milk in nursing mothers. He was a prolific writer, and, while most of his work has been lost, fortunately his pediatric writings, or some of them, survive and have been translated into German along with his treatise on gynecology, in which they are found.

The last physician in Rome to write about the diseases of children was Caelius Aurelianus, the Numidian, who lived in the fifth century, at about which time the seat of learning moved to the Byzantine Empire, where little or nothing was added to our knowledge; but the earlier writings were preserved by the encyclopedists, who studied and condensed them most laboriously. Of these, Oribasius, during the fifth century, wrote extensively on the upbringing of children and their instruction; he also summarized the writings of others. Neuburger says of him that "he caught a reflexion from the setting sun of antiquity." Aetius of Amida was a compiler of merit. He described an epidemic of diphtheria, encephalitis in children and convulsions due to intestinal disturbances which were relieved by purging. He was the first eminent physician to embrace Christianity, and, while mixing his medicines, he prayed that God would make them efficacious.

Paul of Aegina, of the seventh century, called by Withington "the last important product of the great school of Alexandria," another noted compiler, wrote intelligently on pediatrics. At least one of his suggestions is in vogue today, and that is the use of decorticated iris root to chew on while teething.

Arabia.—The center of learning now moved to Arabia. Islam produced several famous physicians. Rhazes in the tenth century wrote on children; Avicenna used much of his material and added to it, and these, together with some of Haly Abbas and Albucasis, were copied and recopied even down to comparatively recent times. The influence of the Arabians on pediatric thought and practice was enormous, as a reading of the early texts will show. It took centuries before their methods and ideas were finally eliminated.

Western Europe.—The pediatric learning of the ancients came to Europe from the East via the school of Salerno and in other ways, and although little of the old lore filtered down directly to western Europe through the dark ages, the indefatigable Sudhoff has unearthed fragments of two interesting manuscripts, one of which, attributed to Galen, is said by Sudhoff to be pseudogalenic. This is usually called "Passiones Puerorum," and was widely known in the middle ages. The other deals with the diseases of children still in the cradle. Both are referred to by Roelans.

Pediatric Incunabula.—There are three incunabula devoted exclusively to pediatrics, and to these must be added a fourth, the pediatric part of "Versehung des Leibs." The first incunabulum is the work of Pietro Bagellardos, of Padua and Venice. This was printed in 1472 and went through several editions. While it gives the practice of the time, it is made up mostly of quotations from the early authorities. In 1538, Peter Toletus republished the work of Bagellardos with some

embellishments, and this edition may still occasionally be found in book catalogs. The year following the first edition of Bagellardos, a remarkable pediatric text by Bartholomaeus Metlinger appeared at Augsburg. This, although burdened with authority, contains original material, good instruction as to the care and feeding of the child and accounts of numerous diseases. The history of Metlinger's work is full of interest. For many years it was widely used throughout Germany, in France and in England, and it was reprinted many times, alone, in connection with the pediatric part of Louffenburg's poem and as a part of Röslin's work on obstetrics entitled "Rosegarten der Frauen." Sometimes Metlinger is mentioned as the author. It was translated into French along with the "Rosegarten" and also into English by one Jonas, and printed in 1540, thus antedating Phaer. Thomas Raynalde appropriated this translation, and for more than a hundred years the "Rosegarten" and the "Regiment of Young Children" were reprinted and studied by English obstetricians. Phaer, who wrote the first book in English on the diseases of children, used some of the material, and practically copied the chapter on google eyes.

The third incunabulum is by Cornelius Roelans, of Mechlin, a rather long work based on the writings of the then known authorities, chiefly Arabian, and written in the most difficult Latin. It was printed in 1483-1484, evidently with some other book which has been lost. It is a rare item, as only two copies are known to be in existence—one at Glasgow, in the Hunterian library, and the other in Leipsic. Sudhoff has also unearthed a number of fragments of this book in various European libraries.

The fourth pediatric incunabulum is to be found in the part of the health poem, "Versehung des Leibs," written by a monk, Heinrich Louffenburg, in 1429, but not printed until 1491. This work contains what are perhaps the earliest pediatric woodcuts, and one figures a child playing with a device almost identical with the "kiddy car" of the present day. An earlier kiddy car may be seen in one of the illustrations of the French editions of Bartholomaeus Anglicus, first printed in 1482. This poem of Louffenburg, the manuscript of which, or a very early copy, is still preserved in Munich, was probably used in teaching the public; the part on the care of pregnant women and young children represents an early effort at child welfare. The hygienic teachings are singularly similar to those in use today. In "Pediatrics of the Past" I have translations of all of Bagellardos and Metlinger, about half of Roelans and some of Louffenburg. Sudhoff recently issued a facsimile edition of the first three with the title of "Erstlinge der Pediatrische Literatur."

Less than a score of years after Roelans died, Sebastianus Austrius, of Ruffach, rewrote his book which he states was written in barbarous

"kitchen Latin." He gives but scant credit to the real author in the first edition, and there is no reference to him in the subsequent ones. As Jonas took Metlinger and Raynalde took Jonas, so Austrius received credit for this pediatric book, which is almost like an anthology of pediatric authority in use at the time. If any knew of these literary thefts, like Kipling's market girls:

> They knew 'e stole, 'e knew they knowed
> They didn't tell, nor make a fuss,
> But winked at 'Omer down the road.
> An' 'e winked back — the same as us.

First English Author.—The first Englishman to write a book on pediatrics was Thomas Phaer, whose "Boke of Children" first appeared in 1545. It went through many subsequent editions, and many changes were made in the original text. Phaer, a lawyer as well as a physician, was a writer of no mean ability.

First French Authors.—The first pediatric book in French appeared at Poitiers in 1565, and is entitled "Cinq livres de la manière de nourrir des enfans des leur naissance." It is the work of Simon de Vallembert, a physician with a practice among the nobility. A charming book to read, albeit a little prolix. There are long chapters on the hygiene of infancy with minute directions for everything which concerns the care of children; there is a chapter on how to rub the head and how to curl the hair of the infant. He devotes a large part of the book to descriptions of disease and their treatment.

Mention must here be made of the first description of whooping-cough by Guillaume de Baillou, or Ballonius, writing in 1578—an interesting example of the appearance of a heretofore unknown infection. Ballonius followed closely in the footsteps of Hippocrates, and, had it not been for his pursuing the fashion of his day of mixing medicine and astrology, he would have had something of the influence of Sydenham some hundred years later.

Von Bókay gives high praise to the *tractatus* of Mercurialis, of Forli, whose intimate knowledge of the ancient writers and commentators gave him a commanding position in his day. It is a long, rambling work, written out by one of his students, which does not merit high praise; this opinion is also held by Hennig and Garrison. His article on stammering is, however, worth reading.

Sixteenth Century Pediatric Literature.—This includes a dozen or more other texts by various authors which we may pass over, with the exception of the children's book of Felix Wurtz, which was published along with his "Practica der Wundartzney" in 1598. It was translated into English in 1656, and is one of the most delightful of the early pediatric books. It is the first work on infantile surgery, dealing as it

does with orthopedics as well as the care of children. This book always reminds me of a saying of John Ruskin: "To see a thing and tell it in plain words is the greatest thing a soul can do." Würtz did not use the old style of writing: "Avicenna says" and "Galen says." He states: "For I presume not to write of such things which I have never had any experience of; those I leave to wiser men." He writes in no uncertain terms about nurses, and gives directions as to what to do and how to do it and what to avoid. Just as Metlinger is the best of the pediatric incunabula, so Wurtz' work is the best of the sixteenth century works on children.

Seventeenth Century Pediatric Literature.—The following century saw a reawakening of the scientific spirit. Disease was studied objectively, and the diseases of early life came in for their share of attention. Only a few of the outstanding writers will be mentioned.

In 1650, the incomparable work on rickets by Glisson and his associates was printed, and a little later, 1669, John Mayow published a book on the same subject, which for clarity of statement is hard to equal. This neglected genius contributed much to science in his experiments on combustion and the changes taking place in the blood due to respiration. What we call oxygen he called the nitro-aerial spirit. A hundred years later, the world that had been deaf to Mayow listened to Lavoisier.

Sydenham and his contributions are almost too well known to need comment. To him we owe much concerning scarlet fever, measles, hysteria, chorea minor, bronchopneumonia and dysentery. He described many other diseases, among which must be mentioned influenza and encephalitis. He brought us back to the Hippocratic method, and it will not be long before a second Sydenham will be needed to lead us back to the bedside of the patient and the personal study of his disease.

Franciscus Sylvius wrote his *"de morbis infantum"* in 1674, and an English translation by Richard Gower appeared in 1682. He used opium in large quantities, recommended what we would call alkalis for many conditions and refers to "green stone with gripes." His therapy was followed to a considerable extent by Walter Harris in his "Acute Diseases of Infancy," which first appeared in Amsterdam in 1689. It was translated into English and ran through several editions. Harris condemned Sylvius as "the opiate doctor," but he recommends again and again "testacious powders" of which he notes a great many, including crab's eyes, prepared chalk, oyster shells and pearls. These "absorbents of acids" were used for all sorts of conditions, and Harris relates a cure of convulsions or tetany by the administration of crab's eyes, which was the name given to the gastroliths or gastric teeth of the gizzard of the common crayfish. They are composed chiefly of pure

calcium carbonate and phosphate. Thus it will be seen alkalis and calcium were used for the same conditions for which we use them today even if their use had not been "rationalized."

The seventeenth century saw a number of other notable contributions, such as the description of thymus death by Felix Platter, in 1614, and of cretinism by Hoefer, in 1657. This was, too, the century of St. Vincent de Paul, patron saint of orphans and orphan asylums, through whose offices the Hospice des enfans trouvés was opened in 1670, continuing a charity started some years before by an unknown woman.

LITERATURE OF THE EIGHTEENTH CENTURY

The eighteenth century was by no means sterile when it comes to work on the diseases of children, and this in spite of the elaborate theories of disease in vogue at that time. The first textbook written in a style at all similar to that of modern writers was that of Nils Rosen von Rosenstein, one of the brightest lights of Swedish medicine. This appeared in Sweden in 1764, and was translated into German, French and Dutch; and there is an English edition by Andrew Sparrman which first appeared in 1776. This contains excellent chapters on the care of children and studies on infant mortality, but the best part of the book is the excellent clinical description of disease. The accounts of smallpox in children and of congenital syphilis are remarkable.

In Scotland lived Robert Whytt, a marvellously clear thinker and worker, neurologist, physiologist and internist. In 1768, he published his "Observations on the Dropsy in the Brain." This essay is based on his study of twenty cases, and since his time there has not been added a single clinical feature of importance concerning tuberculous meningitis which could be determined by the means that were at his disposal. It is a model of a clinical study even to this day.

Among the other notable works are two small ones of great importance. The first is the "Essay on the Nursing and Management of Children" by William Cadogan. He was an advocate of much which we advise today. Four-hour, and even longer, intervals in feeding, sensible loose clothing, digestible food, fresh air and proper exercise. It compares very well with modern books on the subject. The second is "An Essay on the Diseases Most Fatal in Infancy," by the ill fated George Armstrong. Here is an excellent account of some diseases of children, including "The Watery Gripes," or diarrhea. His chief therapeutic measure was to empty the bowel, and then to administer a "weak antimonial puke." In a subsequent edition of his book he described congenital hypertrophy of the pylorus, three cases in one family. This was some years before Hezekiah Beardsley (1784) of New Haven, Conn., described a case of the same condition with a report of the

necropsy. Armstrong started a dispensary for poor children in London, and treated more than 35,000 patients. He inscribed his book to the queen, stating that "this is a field that stands greatly in need of cultivation; and your majesty's gracious countenance to an attempt of this, cannot fail to have a happy effect in exciting others to make further improvements on it." The appeal fell on deaf ears. Armstrong's dispensary was closed, and, like many other pioneers in good work, he ended his days in poverty and seclusion.

Michael Underwood, whom Garrison calls the last "man midwife," was the first Englishman to write a textbook in our present day sense of the word. His book appeared first in 1784, and it went through ten editions, the last, having suffered revision at various hands, appeared in 1846. For more than sixty years it was used as a textbook, which is no mean record. Underwood gave the first unquestioned description of poliomyelitis.

In America, at least two notable men contributed to pediatric literature. Samuel Bard's description of diphtheria was called by Osler "an American classic of the first rank." Benjamin Rush gave us the best early account of summer diarrhea, and his descriptions of influenza in children, and dengue are full of merit. Rush was such a fluent and easy writer that his works are still sought after.

This brings us to the end of the eighteenth century; a host of pediatric discoveries must be passed over, but mention must be made of the elder Heberden's description of chickenpox in 1767 and of the younger Heberden's "Epitome of Diseases of Children." The Latin edition of this came out in 1804, and the English one in the following year. This is one of the most remarkable of the pediatric items. The first edition is a tiny volume which may be carried in the vest pocket. It contains sixty-one chapters, and, what is almost unheard of in medical literature, not an extra word. If all medical writing could be done on the same basis, it would prevent such laments as were made by James Atkinson of York, who complained in that "most delightful of all medical bibliographies," "Medical Bibliography A.B.," that his sacrum and crista ilei had been aching most confoundedly "and after all to very little purpose and much less entertainment."

As we are all familiar with the trend of pediatrics in the nineteenth and twentieth centuries and with its development into a specialty, I will close with a quotation which I have always especially liked. It is from "Friar Jerome," a poem by Thomas Bailey Aldrich, which tells a beautiful story and which is, I think, one of the best of the poems which have some relation to medicine. I have spent many happy hours in company with these old worthies whom I have mentioned, so that I

have come to feel that I know some of them personally, and I have the same impression about their books as expressed in the poem. Aldrich says of Friar Jerome and the monastery library:

> They did not seem like books to him,
> But Heroes, Martyrs, Saints — themselves
> The things they told of, not mere books
> Ranged grimly on their oaken shelves.

INSULIN IN THE TREATMENT OF MALNOURISHED INFANTS *

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TORONTO, CANADA

The use of insulin in the treatment of malnourished infants was first suggested by Pitfield [1] in 1923. He considered that beneficial effects were obtained in two cases by the daily administration of 1 unit of insulin, given at the same time as the morning feeding. In 1924, Marriott [2] concluded that the nutrition of malnourished infants might be rapidly improved by intravenous injections of glucose and insulin. Barbour,[3] as the result of Marriott's work, administered insulin to forty nondiabetic malnourished children. The nutrition of thirty-eight of the forty was benefited. Twenty-three of the children had accompanying infectious conditions, which were also improved. All of these observers concluded that considerable benefit was derived from the injections. However, in none of the foregoing three papers were any blood sugar determinations reported.

Two years ago, in this clinic, insulin was administered to malnourished infants but no beneficial results were detected. The dose given, however, was comparatively small. As a result of Marriott's report, in which he stated that a gain in weight almost invariably occurred following the intravenous injection of glucose and insulin, it was decided to investigate again the action of insulin in these cases. Not only were the cases followed clinically but the level of the glucose in the blood was determined at frequent intervals. Over 350 blood sugar determinations were made.

GLUCOSE AND INSULIN ADMINISTRATION

The procedure, as outlined by Marriott, was the daily intravenous injection of from 9.5 to 14.2 c.c. per pound of body weight of a 20 per cent. solution of glucose containing 15 units of insulin per twenty grams of carbohydrate. In the two cases reported in detail by him, the daily injections were given for a period of ten and eighteen days respectively. We studied the effect of the intravenous administration of

* Received for publication, April 21, 1925.

* From the Wards and Nutritional Research Laboratories of the Hospital for Sick Children, and the Sub-Department of Pediatrics, University of Toronto.

1. Pitfield, R. L.: New York M. J. **118**:217 (Aug. 18) 1923.

2. Marriott, W. McK.: The Food Requirements of Malnourished Infants, J. A. M. A. **83**:600 (Aug. 23) 1924.

3. Barbour, O.: Arch. Pediat. **41**:707 (Oct.) 1924.

10 c.c. per pound of body weight of a 20 per cent. solution of glucose with 15 units of insulin per twenty grams of sugar in eight cases. The details of the cases and the resulting changes in weight are given in Table 1. In this table also is included one infant (Case 9), who was given the insulin subcutaneously fifteen minutes before the glucose. This infant made a good gain in weight but it is to be noted that the caloric value of the food was increased during the period of observation which might account for this. Of the eight infants who were given insulin and glucose intravenously, six were cases of malnutrition, one was a premature infant and one was convalescing from acute intestinal intoxication. Of the seven infants suffering from malnutrition, only one made any gain of note. In this respect our experience did not coincide with that of Marriott.

TABLE 1.—*Intravenous Administration of Glucose and Insulin* *

Case	Age, Months	Diagnosis	Calories in Feeding per Pound of Body Weight	Period of Administration, Days	Weight at Commencement of Treatment		Weight at Conclusion of Treatment	
					Pounds	Ounces	Pounds	Ounces
1	5	Marasmus.....	90	11	6	9	6	10
2	9	Marasmus.....	90	7	8	12	8	7
3	5.3	Convalescent acute intestinal intoxication.	53-80	7	8	5	8	12
4	4.5	Marasmus.....	70	8	6	13	6	15
5	5.5	Marasmus.....	85	3	7	13	7	1
6	1	Marasmus.....	110	4	4	4	4	1
7	5	Marasmus.....	100	6	6	3	6	3
8	3.7	Marasmus.....	85	10	6	14	7	12
9	11.5	Infant feeding.....	65-80	11	12	6	12	13

* Ten cubic centimeters per pound of body weight of a 20 per cent. solution of glucose with 15 units of insulin for each 20 grams of glucose were given daily.

The effect of the subcutaneous administration of 10 c.c. per pound of body weight of a 15 per cent. solution of glucose twice a day, and the subcutaneous administration of insulin at different periods before the injection of the glucose, was studied in seven infants. No local or general ill effect from the subcutaneous injection of 15 per cent. glucose was observed in any case. A number of these infants were in the hospital for a considerable time, consequently two or three courses of treatment were given in certain cases. We included in this group two infants (Cases 8 and 9), who received subcutaneous injections of 10 per cent. glucose. The results are given in Table 2.

It is seen that 15 per cent. glucose was given in thirteen separate periods, and in eight of these periods the weight remained practically stationary or even decreased while in five periods the weight increased. It is of interest to note the following points in regard to these five periods. Case 1 gained in only one period out of three. During the time in which he gained 8 ounces (226 gm.) he received double the amount of insulin given in the other two periods. However, the rate

of gain for the week previous to the administration of the insulin was also 8 ounces. Case 2 gained in one period and remained stationary in the other. During the time in which he gained he received only half the amount of insulin given in the other period, but it is to be noted that the caloric value of his food was increased from 72 to 82 per pound of body weight per day. The gain in weight is probably the result of the increased amount of food given. In regard to Case 3 who gained during two periods, this infant made similar rapid gains in the previous month when receiving glucose without insulin. Case 4 gained rapidly in one period, but during this time the feeding was increased from 85 to 97 calories per pound.

TABLE 2.—*Subcutaneous Administration of Glucose and Insulin* *

Case	Age, Months	Diagnosis	Calories in Feeding per Pound of Body Weight	Units of Insulin per 20 Gm. Glucose	Interval Before Administration of Glucose, Hours	Period of Administration, Days	Weight at Commencement of Treatment		Weight at Commencement of Treatment	
							Lbs.	Ozs.	Lbs.	Ozs.
1	5.7	Marasmus	90	5.0	1½	8	7	0	7	8
	6.2	Marasmus	90	2.5	1½	15	7	8	7	9
	7.2	Marasmus	72	2.5	1½	14	7	6	7	8
2	1.5	Marasmus	72	4.4	1½	6	6	2	6	2
	1.8	Marasmus	82	2.2	1½	6	6	2	6	12
3	4.5	Marasmus	110	5.0	1½	7	8	6	9	10
	4.8	Marasmus	100	2.5	1½	6	9	10	9	14
4	7.3	Marasmus	75	5.0	1½	7	9	4	8	12
	7.7	Marasmus	80	2.5	1½	11	9	0	8	8
	8.5	Marasmus	85-97	4.0	1½	14	8	1	9	14
5	12.3	Infant feeding	80	4.0	1½	6	12	6	12	6
6	1.8	Prematurity	78	2.0	1	15	3	11	3	15
7	1	Prematurity	55-77	2.0	1	16	2	3	2	2
8	5.5	Marasmus	75	3.0	1	30	7	8	9	0
9	4	Marasmus	80-95	4.0	1	31	6	2	6	14

* Ten cubic centimeters per pound of body weight of a 15 per cent. solution of glucose was given subcutaneously twice a day. Different amounts of insulin were given subcutaneously before the administration of the glucose.

The two infants who were given 10 per cent. glucose subcutaneously gained in weight. Case 8, however, gained a total of 21 ounces (595 gm.) in the twenty-one days previous to the administration of the insulin and glucose. We would hardly expect the insulin to increase this rate of gain, so this is not a very suitable case to include in our study. Case 9 only gained 12 ounces (340 gm.) in the month and during this time the feeding was also increased.

The effect of insulin administered subcutaneously before each feeding was studied in six cases. The results are given in Table 3. It is seen that only one child did not increase in weight. One infant (Case 2) gained only slightly, but the remaining four increased in weight satisfactorily. Case 1 made the entire gain of 12 ounces in the first seven days, while in the remaining twenty days although receiving insulin did not gain at all. Case 3 gained over 1 ounce a day but in the previous month during one period of two weeks he gained 20 ounces without the use of insulin. Case 4 did not gain for the first five days after the adminis-

tration of insulin. The feeding was then increased from 72 to 100 calories per pound and the infant gained the greater part of the 16 ounces in the next seven days. Case 6 had gained 1 pound in the previous three weeks, so was really not a very suitable case for this test.

From a study of the results given in Tables 1, 2 and 3, it is seen that the use of insulin resulted in a gain in weight in only 50 per cent. of the cases. In the majority of these cases other factors were present which mitigate the probability that insulin was the cause of the increase in weight.

TABLE 3.—*Administration of Insulin Before Feedings*

Case	Age, Mos.	Diagnosis	Calories in Feeding per Pound of Body Weight	Per Cent. Carbohydrate in Feeding	Units of Insulin per 20 Gm. Carbohydrate	Time Insulin was Given Before Feedings, Min.	Period of Administration, Days	Weight at Commencement of Treatment		Weight at Conclusion of Treatment	
								Lbs.	Ozs.	Lbs.	Ozs.
1	9.5	Marasmus	80	16.5	2.0	60	27	10	7	11	3
2	6.8	Marasmus	90-120	23.0	2.0	60	32	6	10	7	2
3	9	Marasmus	95-100	16.0	2.0	60	11	9	1	9	13
4	5	Marasmus	72-100	9.2	0.8	30	22	7	4	8	4
5	12	Marasmus	150	24.0	1.0	30	9	10	0	9	15
6	9	Infant feeding	70	9.6	1.3	30	25	12	2	13	10

STUDIES ON THE BLOOD SUGAR CONCENTRATION

The effect of the intravenous administration of 20 per cent. glucose on the blood sugar curve was studied. In all cases 10 c.c. per pound of body weight was given. The length of time required for injection was from five to ten minutes, and the time of injection was always at least four hours after the previous feeding. In Chart 1 is shown a curve of the average values found in five cases. In the same figure is also given the curve of the average blood sugar values after the administration of the same dose of glucose plus 15 units of insulin for each 20 gm. of glucose. It is to be noted that the concentration of the blood sugar in the second curve is very low after the first two hours. In regard to the use of the before-mentioned dose of glucose and insulin, Marriott states that "such a solution has sufficient glucose to buffer completely the insulin and we have observed no bad effects." This does not correspond exactly with our experience. After the injection of the before-mentioned dose of glucose and insulin we noticed in an occasional case that the infant was slightly drowsy, and on determining the blood sugar concentration we usually found it below 0.04 per cent. Accordingly, we have arrived at the conclusion that the use of this amount of insulin is not without its dangers.

The effect of the administration of insulin at different intervals before the injection of glucose was studied. Eadie and MacLeod [4]

4. Eadie, G. S., and MacLeod, J. J. R.: Am. J. Physiol. **64**:285 (April) 1923.

found that, in rabbits, insulin produced its greatest effect on the diminution in the rise in blood sugar when given from one to one and a half hours before the injection of the sugar. We found a greater effect was produced in infants when the insulin was given at an interval of one and one-half hours before the glucose, than with any interval shorter than this. This is illustrated in Table 4. From Table 4 and Chart 1, it would appear that the injection of insulin and glucose together is possibly not the best method of administration because then the insulin

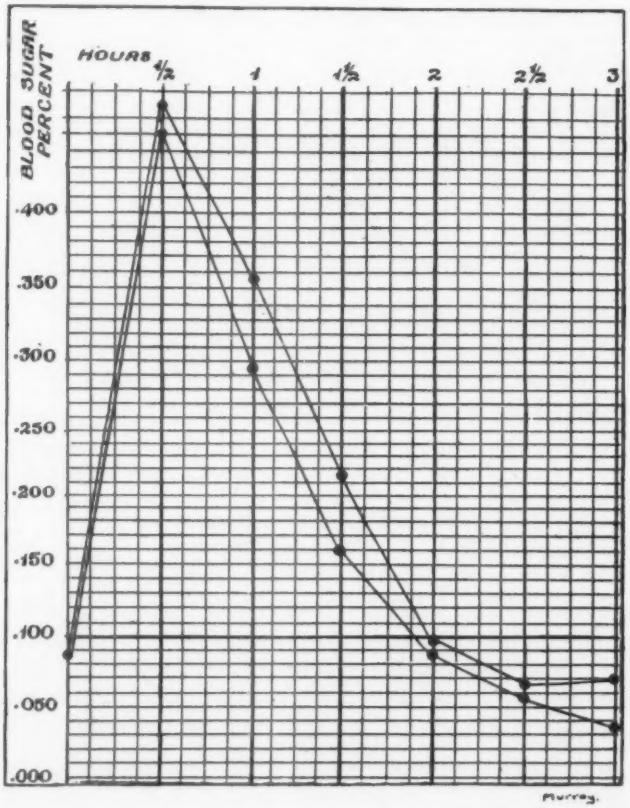

Chart 1.—Effect of intravenous administration of 20 per cent. glucose with and without insulin. The upper curve represents the average values found in five cases who were given ten cubic centimeters per pound of body weight of a 20 per cent. solution of glucose intravenously. The lower curve represents the average values found in five cases who were given the same amount of glucose with 15 units of insulin per twenty grams of glucose.

is producing its greatest effect when the glucose in the blood is already being reduced very rapidly by the normal process in the body. Another possible objection to the administration of 20 per cent. glucose intravenously is that it raises the level of the blood sugar to such a height

that this in itself may exert a somewhat harmful effect. Also in these cases there is a very definite loss of glucose in the urine. We have found almost invariably that there is sugar in the urine when the blood sugar reaches a height of about 0.200 per cent. or more.

For the before-mentioned reasons, and also because of the difficulty of a daily intravenous injection to these small infants, we studied the effect of the subcutaneous administration of a 15 per cent. solution of glucose. Ten cubic centimeters of the solution per pound of body weight was given twice a day. Insulin was given from one to one and a half hours before the glucose, and the dose varied from 1 unit of insulin per four grams of glucose to 1 unit per ten grams of glucose. The effect of the insulin varied tremendously in different infants. This is well illustrated in Chart 2, which shows the different curves produced in two apparently normal infants. We found that a dose of 1 unit of insulin per four grams of glucose, given from one to one and a half hours

TABLE 4.—*The Effect on the Blood Sugar Curve of Insulin Administered at Different Intervals Before the Intravenous Injection of Glucose* *

Interval Between Administration of Insulin and Glucose	Per Cent. Glucose in Blood			
	Immediately Before Injection of Glucose	30 Minutes After Injection of Glucose	1½ Hours After Injection of Glucose	2½ Hours After Injection of Glucose
No insulin	0.073	0.268	0.083	.....
30 minutes	0.043	0.246	0.050	0.048
60 minutes	0.040	0.274	0.058	0.048
90 minutes	0.025	0.185	0.053	0.025

* The amount of insulin given in each instance was 1 unit for every 6 grams of glucose injected. The amount of glucose injected was 10 c.c. per pound of body weight of a 10 per cent. solution. The injections were made daily on the same infant.

before the glucose, would occasionally produce a hypoglycemic reaction. We consequently reduced the dose to 1 unit of insulin for each 6 to 8 gm. of glucose, and administered it subcutaneously usually one hour before the injection of the carbohydrate. That this dose may produce a very efficient reduction in the concentration of the blood sugar is shown in Chart 3. So far as could be determined, there was no delay in the absorption of the injected fluid. We again desire to emphasize the very great variation in the effect which insulin may produce in different infants and although this dose proved quite safe in our hands, we still do not believe that it can always be administered with impunity.

In regard to the administration of insulin before the feeding, we found that a dose even as small as 1 unit per ten grams of carbohydrate in the feeding, given from one-half to one hour before each feeding in certain cases induced a hypoglycemic reaction. In this regard it is of interest to note that very frequently it is impossible to tell from the clinical appearance of the infant whether or not it is suffering from hypoglycemia. We have frequently observed a blood sugar concentra-

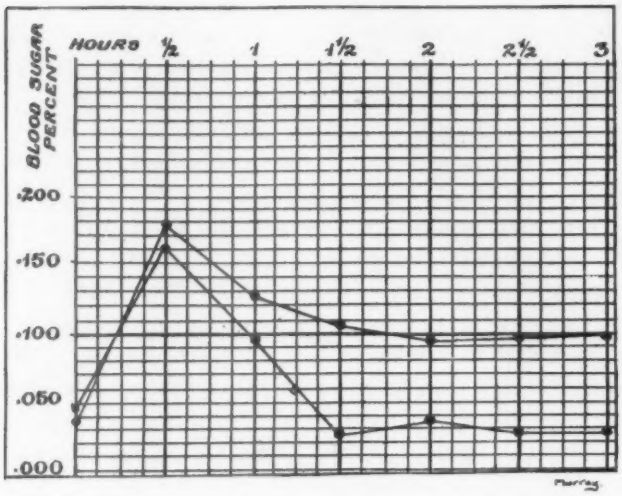

Chart 2.—Variation in the effect of same dose of insulin in different infants. Ten cubic centimeters per pound of body weight of a 10 per cent. solution of glucose was injected intravenously. One unit of insulin was given for every 4 gm. of glucose. This was administered subcutaneously one and one-half hours before the glucose injection.

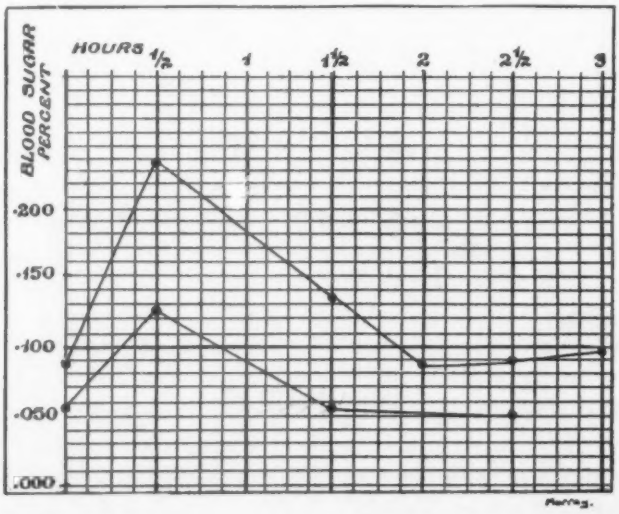

Chart 3.—Effect of small amount of insulin administered one hour before the subcutaneous injection of glucose. The amount of glucose was ten cubic centimeters per pound of body weight of a 15 per cent. solution. The usual blood sugar values found are represented by the upper curve. The lower curve shows the effect of the administration, one hour before the glucose, of 1 unit of insulin per six grams of glucose.

tion of 0.033 per cent., or even of 0.025 per cent., over a period of one and a half hours with no clinical evidence at all of the hypoglycemia. At first sight one feels almost inclined to doubt these figures. The procedure used in the determination of the blood sugar is based on the Shaffer-Hartmann method and will be reported in detail elsewhere. It has been used so far in nearly 3,000 determinations, with very satisfactory results. The low values were frequently checked by simultaneous determinations on normal blood which always was found to fall within the normal range. Also the method was checked at intervals with known low concentrations of glucose, the strength of which had been determined by the polariscope. In this way we are quite convinced that we were actually dealing with marked hypoglycemia.

It is known that marantic infants have a lower concentration of blood sugar than normal infants, and it has been demonstrated [5] that these infants can metabolize injected glucose more rapidly than normal infants.[6] In view of this it would not appear that these infants are suffering from any lack of insulin production, and this in itself would rather lessen the expectation of any beneficial effects from its administration.

SUMMARY

1. The effect of the administration of insulin to malnourished infants has been studied. Nine infants received insulin in conjunction with the intravenous injection of 20 per cent. glucose. Seven infants, over a total of thirteen periods, received insulin in conjunction with 15 per cent. glucose subcutaneously; two infants in conjunction with 10 per cent. glucose subcutaneously and six infants in conjunction with the feeding.

2. A definite increase in the weight was obtained in 50 per cent. of the cases. In these cases in many instances, however, other factors were present which lessened the probability that insulin was the cause of the increase in weight.

3. The intravenous injection of 20 per cent. glucose and insulin together is probably not the most efficient method of administration.

4. Insulin apparently produces the most marked diminution in the elevation of the blood sugar when administered about one and one-half hours before the glucose.

5. The effect of insulin on the blood sugar concentration varies tremendously in different infants, consequently its administration is not without danger.

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5. Mattill, P. M.; Mayer, K. M., and Sauer, L. W.: Dextrose Tolerance in Atrophic Infants, Am. J. Dis. Child. **19**:42 (Jan.) 1920.

6. Further studies on this aspect of the sugar metabolism of infants are being reported in another paper.

6. Certain infants may have a very marked hypoglycemia without showing any hypoglycemic reaction.

CONCLUSION

No positive evidence has been obtained that insulin, per se, when administered with carbohydrate to malnourished infants produces any beneficial effect.

ANEMIA IN A NEW-BORN INFANT

REPORT OF A CASE *

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The older the infant, the more numerous are the factors that operate to produce an improverishment of the blood. In an infant, the discoverable causes of this condition may be listed as dietetic and constitutional conditions, infections with pyogenic organisms, tuberculosis, syphilis, diphtheria or malaria. The new-born infant, however, offers possibly only traumatic and spontaneous hemorrhages, including the hemorrhagic disease of the new-born, hemolytic jaundice and the rarer forms of familial icterus. Active congenital syphilis may be included in this list. The mother may be a factor in this condition if suffering from an acute illness, from tuberculosis or from syphilis while pregnant. Mothers of advanced age and weak constitution, or those who have had repeated pregnancies at short intervals with abortions and hemorrhages, might influence the child's condition.

Donnally [1] and Ecklin [2] have each reported a case of anemia in a new-born infant, the first observations of which were made after the child was 10 days old. That this condition can exist at birth is shown by a case reported by Süsstrunk,[3] in which the first count was made the third day. This child died at the age of 10 days and necropsy showed no change in the blood-forming organs. The patient here reported showed birth anemia, but rapidly improved and completely recovered.

REPORT OF CASE

History.—M. W., a girl, white, was born Jan. 30, 1925. The mother, aged 21, had always been in excellent health, and had never used drugs of any kind. She had been under the routine prenatal care of the hospital since the fifth month, and had shown nothing abnormal. The Wassermann test was negative. The father, aged 25, denied venereal infection. A brother of the patient, who was born at the Presbyterian Hospital Jan. 23, 1924, weighed 7 pounds 13 ounces (3.5 kg.). His blood examination at this time showed: hemoglobin, 116;

* Received for publication, April 15, 1925.

* From the Pediatric Ward of the Presbyterian Hospital.

1. Donnally, H. H.: Anemia in the New-Born, Am. J. Dis. Child. **27**: 369-375 (April) 1924.

2. Ecklin, T.: Ein Fall von Anämie bei einem Neugeborenen, Monatschr. f. Kinderh. **15**:425, 1919.

3. Süsstrunk, G.: Schwerste Anämie bei einem Neugeborenen, Ztschr. f. Kinderh. **38**:586 (Aug.) 1924.

erythrocytes, 5,250,000; white corpuscles, 21,650. The bleeding and coagulation time were five and seven minutes respectively. He was breast fed and was in perfect health at 1 year of age.

The mother entered the hospital in active labor, at approximately the estimated date of confinement and had a normal delivery at the end of a five hour labor. Her blood examination before delivery showed: hemoglobin, 78; erythrocytes, 3,650,000; white corpuscles, 13,000, and blood pressure, 90 systolic, 70 diastolic. This compared approximately with that taken at the former delivery (Jan. 15, 1924), when the hemoglobin was 80, erythrocytes 4,350,000, white corpuscles 10,700 and blood pressure 110 systolic, 70 diastolic.

The infant cried immediately after delivery; there was no evidence of birth asphyxia and no umbilical hemorrhage. The temperature was 97 F. She weighed 6 pounds 8 ounces (3 kg.), was 44 cm. long, suboccipitobregmatic circumference 30 cm., shoulder 30 cm.; diameter of head, occipitomental, 13 cm.; occipitofrontal, 11 cm.; suboccipitobregmatic, 10 cm.; biparietal 9 and bitemporal 7.5 cm.

Physical Examination.—The general appearance was that of a very pale newborn infant, who was well developed, breathing quietly and lying comfortably.

The skin was fair and of normal tissue turgor, with no signs of icterus, eruption, or abnormal pigmentation. There was no desquamation of the palms or soles. As may be seen from the measurements, the head was well formed and symmetrical. The eyes reacted well to light. There was no conjunctival hemorrhage and the conjunctivae were pale. The ear drums were normal. There was no noticeable obstruction in the nose, and no excess secretion. The lips and buccal mucous membranes were pale and free from fissures and ulcerations.

There was no adenopathy, or any obstruction to breathing. There was no percussable thymic enlargement. The lungs were well filled with air and showed good expansion and resonance. The heart apex was at the fourth space, nipple line. There was no enlargement and the sounds were of good quality. The pulse was full and of moderate rapidity.

There was no enlargement or tenseness of the abdomen. The liver was enlarged and its edge was felt as a firm mass at the level of the umbilicus. The spleen was readily palpable below the costal margin.

The genitalia were normal. The joints were freely movable and there was no swelling about them, or along the bones. The muscles and limbs were of good tone and strong.

January 30, the blood examination (one hour after birth) was negative by the Wassermann test. Hemoglobin (Dare), 48; erythrocytes, 2,500,000; white corpuscles, 68,400. Stained smears by Wright's method gave polymorphonuclear neutrophils, 60 per cent.; small mononuclears, 35 per cent.; large mononuclear, 1 per cent.; transitional, 1 per cent.; eosinophils, 3 per cent. There were no myelocytes or pathologic nucleoid forms. In counting 200 white corpuscles, 15 normoblasts, 12 megaloblasts and 6 macrocytes were seen. Achromia was marked, and there were many poikilocytes. Blood platelets were 285,000. The bleeding time was five minutes and the coagulation time was four minutes.

The urine was pale, with no albumin or sediment findings.

Roentgen-Ray Examination: The extremities were negative for bone changes. The chest showed no thymic shadow. The heart was within normal limits.

January 31, the child's condition was excellent, the weight was 6 pounds 2 ounces. She was receiving ¾ ounce (22.5 c.c.) of breast milk; second degree

icterus was present. Van den Bergh test for bile pigments in blood (direct) positive. Bleeding time, four and one-half minutes; coagulation time, four minutes.

February 1, the condition was the same. Icterus of the third degree was present. The weight was 6 pounds. She was receiving 4¾ ounces (135 c.c.) of breast milk; bleeding time was four minutes; coagulation time was four minutes. Blood culture was negative.

February 2, the icterus was improved. The weight was 6 pounds 2 ounces. She was receiving 10¾ ounces (325 c.c.) of breast milk. The blood showed hemoglobin, 60; erythrocytes, 3,100,000; white corpuscles, 10,000; polymorphonuclear neutrophils, 50 per cent.; small lymphocytes, 40 per cent.; large lymphocytes, 3 per cent.; eosinophils, 7 per cent. There were no nucleated erythrocytes and the poikilocytes were much reduced in number.

February 3, the icterus was much improved. The liver was normal for a child of that age, and the spleen was barely palpable.

February 4, the icterus had disappeared. The weight was now 6 pounds 5 ounces, and the amount of breast milk she received was 15½ ounces (459 c.c.). Hemoglobin, 70; erythrocytes, 3,000,000, and white corpuscles, 9,000.

February 7, the child's condition was excellent, and the mother insisted on taking the child home. Her weight was now 6 pounds 6 ounces. The spleen was not palpable. The blood showed hemoglobin, 78; erythrocytes, 2,900,000; white corpuscles, 11,000; polymorphonuclear neutrophils, 48 per cent.; small lymphocytes, 32 per cent.; large lymphocytes, 7 per cent., and eosinophils, 13 per cent.

February 21, the patient returned for examination. She was in excellent condition, with good color and tissue turgor. The feeding was entirely by breast, and the child weighed 7 pounds 1 ounce. The spleen was not palpable, and the liver was normal for a child of that age. Hemoglobin, 80; erythrocytes, 3,720,000; white corpuscles, 9,200; polymorphonuclear neutrophils, 50 per cent.; small lymphocytes, 42 per cent.; large lymphocytes, 6 per cent.; eosinophils, 2 per cent. There were no nucleated or other abnormal red cells. Blood platelets, 300,000. Bleeding time was four minutes and coagulation time was five minutes.

COMMENT

The case reported shows a marked anemia in an apparently healthy new-born infant at birth. The blood showed evidence of extreme activity, such as high white corpuscle count, and nucleated red blood cells, with poikilocytes and polychromasia, and decreased blood platelet formation.

There was no evidence of blood destruction, for the jaundice, appearing on the second day and disappearing on the fourth, occurred during improvement in the blood picture, and normal bleeding and coagulation time. Furthermore, the Van den Bergh test for hepatic bilirubin was positive, suggesting this jaundice to be of hepatic origin. During this time the liver also decreased in size.

The spleen steadily decreased in size as the blood picture improved,

and this without treatment of any kind, unless the roentgenogram of the extremities was in some sense a factor. The increase in hemoglobin continued more rapidly than the increase in erythrocytes and the color index was thus kept over rather than under 1.

It was known that the mother's blood picture was normal at the time of this delivery and at the former delivery, and also that the older brother's blood was normal. There was no family history of syphilis, tuberculosis, debility or miscarriages. The factor of a maternal influence must, therefore, be ruled out.

No explanation of the before-mentioned condition can be offered. The child's recovery was rapid and complete without treatment in any way, except for the slight roentgen-ray exposure when the extremities were photographed.

GASTRIC ANALYSES IN NORMAL INFANTS AND IN THOSE CONVALESCENT FROM DIARRHEA *

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Determinations were made of the hydrogen ion concentration and of the amylase and trypsin activity of forty-nine specimens of gastric contents obtained, as aseptically as possible, by stomach tube from a series of normal infants and of those convalescent from diarrhea. In addition, aerobic cultures of each specimen were made on plates of blood agar and Teague's medium. The methods used have been described elsewhere.[1] The infants convalescent from diarrhea were gaining in weight, but still had from two to eight semi-formed stools daily.

FACTORS WHICH MAY AFFECT THE REACTION OF THE GASTRIC CONTENTS

1. *The Presence of Saliva or Duodenal Contents.*—The amounts of amylase and trypsin in these forty-nine specimens of gastric contents were determined in order to ascertain whether they were contaminated with saliva or duodenal contents, for pure gastric secretion probably does not contain either of these enzymes. Saliva possesses a very active amylase [2] and it is usually assumed that trypsin is absent while both enzymes are present in the duodenal contents of normal infants and of those convalescent from diarrhea. If the specimen of gastric contents contained amylase alone, it was presumed to be contaminated with saliva, and if both amylase and trypsin were found, the specimen probably contained duodenal contents with or without saliva.

As may be seen from Table 1, the presence of saliva or of duodenal contents markedly decreased the mean values [3] of the gastric acidity in both the normal and the convalescent groups. The reaction of normal saliva is said to be alkaline and that of the duodenal contents of normal and convalescent infants is about p_H 6.2, so that it is natural that con-

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* From the Department of Pediatrics, Johns Hopkins University and the Harriet Lane Home, Johns Hopkins Hospital.

1. Davison, W. C.: The Duodenal Contents of Infants in Health, and During and Following Diarrhea, Am. J. Dis. Child. **29**:743 (June) 1925.

2. Nicory, C.: Salivary Secretion in Infants, Biochem. **16**:387-389, 1922.

3. The results of individual determinations made at different times on the same patient varied widely, so that the mean values are the only ones that can be compared. Some of the factors responsible for these variations will be discussed later.

tamination with either of these substances would decrease the acidity of the gastric contents. Specimens of gastric contents which have been demonstrated to be free from saliva and duodenal material are the only ones on which reliable conclusions with regard to gastric secretion can be based, yet this factor is usually disregarded in discussions of gastric analyses. Less than one third of all of the specimens of gastric contents were free from saliva or duodenal contents. The presence of saliva in gastric contents is not remarkable, for infants swallow almost all of the saliva secreted. Specimens containing saliva were not visibly different from those free from saliva so that amylase tests are necessary for their differentiation. Because of the presence of bile, contamination with duodenal contents was suspected in five of the seven specimens in which trypsin was found so that trypsin tests are probably not essential. However, the presence of bile was suspected in two additional specimens in which trypsin was absent.

TABLE 1.—*Relation of the Presence of Saliva and Duodenal Contents to the Hydrogen Ion Concentration of the Gastric Contents of Normal Infants and of Those Convalescent from Diarrhea*

State of Digestion of the Infants	Number of Specimens and (Patients)	Percentage of Specimens in Each Group	p_H of Gastric Contents	
			Mean Value	Extremes
All Specimens:				
Normal	28 (7)	....	p_H 4.8	p_H 3.6-7.4
Convalescent from diarrhea	21(10)	....	p_H 4.3	p_H 3.3-7.4
Specimens free from saliva and duodenal contents, that is, less than 1 unit of amylase per cubic centimeter and no trypsin:				
Normal	.....	18	p_H 4.0	p_H 3.6-5.5
Convalescent from diarrhea	.....	33.3	p_H 3.8	p_H 3.5-6.6
Specimens containing saliva but no duodenal contents, that is, from 2.2 to 77.4 units of amylase per cubic centimeter and no trypsin:				
Normal	.....	68	p_H 5.1	p_H 3.6-7.4
Convalescent from diarrhea	.....	50	p_H 5.2	p_H 3.3-7.4
Specimens containing duodenal contents with or without saliva, that is, from 7.3 to 108 units of amylase and from 2.4 to 27.6 units of trypsin per cubic centimeter:				
Normal	.....	14	p_H 5.7	p_H 4.9-7.3
Convalescent from diarrhea	.....	16.6	p_H 5.0	p_H 3.6-7.3

The effect on the reaction of the gastric contents produced by contamination with saliva may also be illustrated by arranging the analyses according to their reactions. The more acid the specimen, the less frequently was amylase found. Only 50 per cent. of the specimens in which the hydrogen ion concentration was from p_H 3.3 to 5.0 contained amylase, while this enzyme was present in 84 per cent. of the specimens in which the reaction was from p_H 5.1 to 7.4. It is, of course, possible that the acidity of the former group of specimens destroyed the amylase and that saliva was more frequently present than these figures indicate. However, very few specimens were more acid than p_H 4.0 and salivary amylase, if it resembles duodenal or bacterial amylase, is not totally destroyed at p_H 4.0.

2. *Diet.*—The reaction of the gastric contents of both normal and convalescent infants who were fed with some form of lactic acid milk was much more acid than that of the infants receiving sweet milk. The figures in Table 2 which do not take into account the effect produced by contamination with saliva are comparable to those published by Marriott and Davidson,[4] who found that the hydrogen ion concentration of the gastric content of normal infants was p_H 5.1 when fed with sweet milk and p_H 3.7 with lactic acid milk.

TABLE 2.—*Relation of Diet to the Hydrogen Ion Concentration of the Gastric Contents of Normal Infants and of Those Convalescent from Diarrhea*

	Diet of Sweet Milk (p_H 6.7)			Diet of Lactic Acid Milk (p_H 4.0 to 5.0)†		
State of Digestion of the Infants	Percentage of Specimens in Each Group	p_H of Gastric Contents* Mean Value	Extremes	Percentage of Specimens in Each Group	p_H of Gastric Contents* Mean Value	Extremes
Normal	37.5	p_H 5.4	p_H 3.3-7.4	62.5	p_H 4.5	p_H 3.6-7.2
Convalescent from diarrhea	27.0	p_H 5.6	p_H 3.3-7.4	73.0	p_H 4.2	p_H 3.5-7.1

* Exclusive of specimens containing trypsin. These were omitted because the presence of bile usually made duodenal contamination obvious.

† Includes whole lactic acid milk (p_H 4.0), protein milk (p_H 5.0) and buttermilk (p_H 4.7). The whole lactic acid milk was made by adding 8.0 c.c. of lactic acid (U. S. P.) to one quart of whole milk. The protein milk was prepared by emulsifying the curd from one quart of whole milk in one quart of buttermilk. Buttermilk consisted of milk containing 1 per cent. fat, fermented by mixed cultures of B. bulgaricus and S. acidi lactici.

3. *Diet and Contamination with Saliva or Duodenal Contents.*—From the data in Tables 1 and 2, it would seem that the acidity of the gastric contents of normal infants was usually somewhat lower than that found in convalescent infants except when saliva was present or when both groups of infants were fed with sweet milk. Under the two latter conditions, the gastric acidity of the normal group was slightly higher than that of the convalescent group. These differences were so slight and so inconstant that it is probable that the gastric secretion of both groups was similar. In Table 3, as well as in the subsequent tables, the two groups have been combined, for there was no apparent difference in the effect of the various factors on the results of the gastric analyses of either group when studied separately.

The mean hydrogen ion concentration of the specimens of gastric contents, free from saliva and duodenal contents, which were obtained from infants fed with sweet milk, was p_H 3.9, and from those receiving some form of lactic acid milk was p_H 3.5 (Table 3). These values probably represent the true acidity of the gastric contents of infants when fed with either of these diets. The presence of saliva or duodenal contents decreased the gastric acidity in infants on each of the diets.

4. Marriott, W. McK., and Davidson, L. T.: The Acidity of the Gastric Contents of Infants, Am. J. Dis. Child. **26**:542-553 (Dec.) 1923.

The presence of saliva may have accounted for the lower acidity (from p_H 3.9 to 4.6) reported by Babbott and others [5] in normal infants fed with a dried milk mixture at p_H 6.2. Such great variations in the reaction of the gastric contents were produced by the diet and the amount of saliva or duodenal material present in the specimen that both of these factors must be considered before conclusions can be drawn [6] in regard to actual gastric secretion.

TABLE 3.—*Relation of the Diet and Contamination with Saliva or Duodenal Contents to the Hydrogen Ion Concentration of the Gastric Contents of Normal Infants and of Those Convalescent from Diarrhea*

State of Digestion of the Infants	Diets	Specimens Free from Saliva and Duodenal Contents, that is, Less than 1 Unit of Amylase per C.c. and No Trypsin			Specimens Containing Saliva but No Duodenal Contents, that is, from 2.2 to 77.4 Units of Amylase per C.c. and No Trypsin			Specimens Containing Duodenal Contents with or without Saliva, that is, 7.3 to 108 Units of Amylase and 2.4 to 27.6 Units of Trypsin per C.c.		
		Percentage of Specimens in Each Group	p_H of Gastric Contents		Percentage of Specimens in Each Group	p_H of Gastric Contents		Percentage of Specimens in Each Group	p_H of Gastric Contents	
			Mean Value	Extremes		Mean Value	Extremes		Mean Value	Extremes
Both groups Normal infants and those convalescent from diarrhea	Sweet milk (p_H 6.7)	7	p_H 3.9	p_H 3.6-4.0	23	p_H 5.6	p_H 3.3-7.4	2	p_H 5.7	p_H 5.7
	Lactic acid milk* (p_H 4.0-5.0)	18	p_H 3.5	p_H 3.5-6.6	36	p_H 5.0	p_H 3.6-7.2	14	p_H 5.3	p_H 3.6-7.3

* See second footnote, Table 2.

4. *Time After Last Feeding, at Which the Specimens were Obtained.*—The specimens were collected at various times, from fifteen minutes to eleven and a half hours after a meal. The mean interval was four hours. The mean value of the hydrogen ion concentration of the specimens of gastric contents obtained less than six hours after a meal was p_H 4.9, while that of specimens obtained after a longer interval was p_H 6.6. The probable explanation for this difference in reaction lies in the fact that 73 per cent. of the specimens obtained within six hours of a meal contained amylase (saliva), while this enzyme was present in 100 per cent. of the specimens collected later. Why saliva should be more frequently found in specimens obtained later than six hours after a meal, is not clear. The time after a meal had no apparent relation to the frequency with which trypsin (duodenal contents) was found. Babbott and his co-workers [5] found that the gastric acidity increased from p_H 6.2 (the reaction of their diet) twenty minutes after a meal to p_H 3.9 two hours later but observations after a longer interval were not made.

5. Babbott, F. L., Jr.; Johnston, J. A.; Haskins, C. H., and Shohl, A. T.: Hydrogen Ion Concentration of Gastric Contents of Infants, Am. J. Dis. Child. **26**:475 (Nov.) 1923.

6. Babbott, F. L., Jr.; Johnston, J. A., and Haskins, C. H.: Gastric Acidity in Infantile Tetany, Am. J. Dis. Child. **26**:486 (Nov.) 1923.

5. *Body Temperature.*—As may be seen from Table 4, slight elevations of the body temperature were associated with a reduction of gastric acidity and also with an increase in the frequency with which amylase (saliva) was found. It is not known whether infants suffering from fever have increased salivation but they apparently swallow saliva more frequently than infants whose body temperature is normal. Ylppö [7] has recently reported a reduction in the acidity of the gastric contents of infants whose body temperatures became elevated 1 degree C. or more, as a result of hot baths or of vaccination, that is, from a mean value of p_H 4.5 in infants of normal temperature to one of p_H 5.3 in those who were febrile. No determinations of the amylase (saliva) content of Ylppö's specimens were made, so it is impossible to know whether this reduction in the gastric acidity represents the effect of the increased temperature on gastric secretion, as Ylppö believes, or whether it can be explained by the increased amount of saliva in the gastric contents of febrile infants, as my analyses seem to demonstrate. The mean value of the hydrogen ion concentration of ten specimens of gastric contents,

TABLE 4.—*Relation of Body Temperature to the Hydrogen Ion Concentration and Saliva Content of the Gastric Contents of Normal Infants and of Those Convalescent from Diarrhea*

Body Temperature of the Infants	Number of Specimens and (Patients)	p_H of Gastric Contents*		Percentage of Specimens in Each Group Containing Saliva but No Duodenal Contents, that is, from 2.2 to 77.4 Units of Amylase per C.c. and No Trypsin
		Mean Value	Extremes	
Normal	22 (7)	p_H 4.1	p_H 3.5-7.2	55
Slightly febrile (100-101 F.)	14 (4)	p_H 5.9	p_H 3.3-7.4	98

* Exclusive of those specimens containing trypsin.

uncontaminated by saliva or by duodenal contents, obtained from infants of normal temperature in my series was p_H 3.9. An identical reaction was found in the only specimen free from saliva and duodenal contents, which was obtained from the febrile infants but of course no conclusions can be drawn from comparison with this one case. Marriott and Davidson [4] found that the gastric acidity of infants fed with cows' milk and who were suffering from acute or chronic infections was reduced from an average value of p_H 5.1 in normal infants to one of p_H 5.35. As these infants were undoubtedly febrile, this reduction in gastric acidity can probably be explained as a direct or indirect result of the elevated body temperature. The presence or absence of saliva or duodenal contents was not determined.

The regularity with which Ylppö [7] and Marriott [4] found a reduction in gastric acidity in febrile infants as well as the results of experiments

7. Ylppö, A.: Ueber den Einfluss Mechanischen und infektiösen Fiebers auf die Acidität des Mageninhalts bei Säuglingen, Acta Pediat. **3**:213-231, 1924.

on dogs by Meyer, Cohen and Carlson,[8] and the mass of clinical evidence that has accumulated since Beaumont's [9] observations in 1833, make it extremely probable that increased body temperature diminishes gastric acidity, but whether this reduction is always due to the contamination of the gastric contents with saliva is not known. This question cannot definitely be settled by laboratory means unless the analyses of gastric contents include tests by which contamination with saliva or duodenal contents may be ascertained.

TABLE 5.—*Relation of the Presence of Vomiting to the Hydrogen Ion Concentration and Saliva Content of the Gastric Contents of Normal Infants and of Those Convalescent from Diarrhea*

Existence of Vomiting	Number of Specimens and (Patients)	p_H of Gastric Contents*		Percentage of Specimens in Each Group Containing Saliva but No Duodenal Contents, that is, from 2.2 to 77.4 Units of Amylase per C.c. and No Trypsin
		Mean Value	Extremes	
No vomiting	28 (9)	p_H 5.0	p_H 3.5-7.4	68
Occasional vomiting	8 (5)	p_H 4.0	p_H 3.5-7.4	75

* Exclusive of those specimens containing trypsin.

6. *Vomiting.*—The existence of occasional vomiting increased the acidity of the gastric contents in spite of the fact that saliva (amylase) was a little more frequently found in the specimens obtained from infants who vomited. If only the specimens which were free from saliva and duodenal contents were considered, the mean value of the reaction of those obtained from infants who did not vomit was p_H 4.0 and from those who vomited occasionally was p_H 3.7. This variation in the acidity of the gastric contents of the two groups may possibly be explained in two ways: first, in those infants who vomited, the frequent emptying of the stomach may have stimulated the gastric mucosa to an excess secretion of acid, and second, the gastric contents of infants who did not vomit may have been buffered by residual food material.

FACTORS WHICH MAY AFFECT THE TYPES OF ORGANISMS FOUND IN GASTRIC CONTENTS

1. *The Presence of Saliva or of Duodenal Contents.*—As might be expected [10] streptococci and gram-negative cocci, which are mouth organisms, were more often found in specimens containing saliva, and colon

8. Meyer, J.; Cohen, S. J., and Carlson, A. J.: Contribution to the Physiology of the Stomach. Gastric Secretion During Fever, Arch. Int. Med. **21**: 354-365 (March) 1918.

9. Beaumont, W.: Experiments and Observations on the Gastric Juice and Physiology of Digestion, Plattsburg, 1833.

10. Kopeloff, N.: Bacteriologic Studies of Gastric Fractions Obtained by the Rehfuss Method, J. Infect. Dis. **30**:613 (June) 1922.

bacilli were more frequent in specimens contaminated by duodenal contents. Otherwise, contamination with saliva or with duodenal material had no apparent effect on the results of gastric cultures.

2. Diet.—There is much clinical evidence that diets consisting of some form of lactic acid milk are often efficacious in the treatment of digestive disturbances in infants. The reason usually advanced for this form of therapy is that the soured milk, because of its acidity, prevents the proliferation of bacteria in the stomach and the upper intestine. The assumption that the benefit of soured milk is due to its antiseptic action

TABLE 6.—*Relation of the Presence or Absence of Saliva or Duodenal Material to the Types of Organisms Found in the Gastric Contents of Normal Infants and of Those Convalescent from Diarrhea*

Presence or Absence of Saliva (Amylase) or Duodenal Material (Trypsin) in the Specimens of Gastric Contents	No. of Specimens	Percentage of Specimens in Each Group Containing the Following Organisms (Aerobic Cultures)							
		Sterile	Colon Group	Strepto-cocci	Staphylo-cocci	Aciduric Bacilli	Spore Bearing Bacilli	Gram-Neg. Cocci	Yeasts
Specimens free from saliva and duodenal contents	11	9	36	45	55	27	0	9	27
Specimens containing saliva but no duodenal contents	26	7	19	54	46	35	4	15	19
Specimens containing duodenal contents with or without saliva	7	0	43	43	29	29	14	14	29

presupposes two premises: first, that bacteria are responsible for diarrhea and, second, that these organisms enter the intestine via the mouth and the stomach. That typhoid and dysentery bacilli fulfil both of these postulates is unquestioned and it is possible, though by no means proved that the acidity of soured milk or of gastric contents may prevent infections with these organisms. In simple diarrhea, however, the only bacteria which apparently play any active rôle are of the colon group.[11] These organisms, when implanted in the duodenum, may possibly, by the action of their growth products, accelerate peristalsis.[1] It is just as likely that colon bacilli reach the duodenum by ascension from the cecum and

TABLE 7.—*Relation of Diet to the Types of Organisms Found in the Gastric Contents of Normal Infants and of Those Convalescent from Diarrhea*

Diet	No. of Specimens and (Patients)	Percentage of Specimens in Each Diet Group Containing the Following Organisms (Aerobic Cultures)							
		Sterile	Colon Group	Strepto-cocci	Staphylo-cocci	Aciduric Bacilli	Spore Bearing Bacilli	Gram-Neg. Cocci	Yeasts
Sweet milk	14 (7)	0	31	54	38	15	8	31	15
Lactic acid milk*	35 (12)	9	23	46	43	43	6	6	31

* See second footnote, Table 2.

11. Davison, W. C.: The Bacteriology of Diarrhea in Infants, South. M. J. **17**:552-560 (Aug.) 1924

colon (endogenous infection) as by descent after mouth ingestion (exogenous infection). There are at least two ways in which diets of soured milk may prevent bacterial growth: first, by the actual destruction of organisms in the stomach and the intestine and, second, by furnishing a culture medium which is unfavorable for the multiplication of bacteria.

As may be seen in Table 7, the three specimens (only 9 per cent.) which did not contain viable organisms were obtained from infants receiving lactic acid milk or protein milk.

TABLE 8.—*Relation of Diet to the Types of Organisms Found in Gastric Contents, Which Contained Saliva but no Duodenal Contents, Obtained from Normal Infants and from Those Convalescent from Diarrhea*

Diet of the Infants	Number of Specimens Containing Saliva but No Duodenal Contents	Percentage of Specimens in Each Group Containing the Following Organisms (Aerobic Cultures)							
		Sterile	Colon Group	Strepto-cocci	Staphylo-cocci	Aciduric Bacilli	Spore Bearing Bacilli	Gram-Neg. Cocci	Yeasts
Sweet milk.....	9	0	22	67	44	22	11	33	22
Protein milk.....	12	8	8	58	50	58	0	0	25

3. *Combined Effect of Diet and the Presence of Saliva.*—In order that the effect of both diet and salivary contamination might be studied, the analyses of the specimens containing saliva obtained from infants fed with sweet milk or protein milk were arranged in Table 8. The fact that one specimen (8 per cent.) was sterile, the gram-negative cocci absent and the incidence of colon bacilli reduced in the gastric contents of infants fed with protein milk may indicate an inhibiting effect of soured milk diets. Aciduric bacilli (*B. bulgaricus, B. acidophilus and B. bifidus*) were more frequently encountered in infants fed with buttermilk and with protein milk (Tables 7 and 8). This increase was probably due to the bacilli of the bulgaricus group present in these diets. The effect of diet on the incidence of the other organisms was not striking.

TABLE 9.—*Relation of the Hydrogen Ion Concentration to the Types of Organisms Found in the Gastric Contents of Normal Infants and of Those Convalescent from Diarrhea*

Hydrogen ion Concentration of the Gastric Contents	No. of Specimens*	Percentage of Specimens in Each Group Containing the Following Organisms (Aerobic Cultures)							
		Sterile	Colon Group	Strepto-cocci	Staphylococci	Aciduric Bacilli	Spore-Bearing Bacilli	Gram-Negative	Yeasts
p_H 3.3–3.9.....	13	15	23	46	38	46	8	0	31
p_H 4.0–4.4.....	7	0	57	29	29	43	0	29	14
p_H 5.0–5.6.....	9	0	11	78	56	44	0	11	44
p_H 6.1–7.4.....	8	12.5	12.5	37.5	62.5	0	12.5	25	0

* Exclusive of those specimens containing trypsin.

4. *Hydrogen Ion Concentration.*—As depicted in Table 9, the reaction of the gastric contents had no apparent relation to the frequency with which various organisms were found. Two of the most acid specimens (15 per cent.) and one of the least acid (12.5 per cent.) were sterile. *B. coli* was more frequently found in the more acid specimens. It would, therefore, seem that the acidity, per se, was not responsible for the prevention of bacterial growth.

In a test tube, buttermilk and protein milk will kill *B. coli* and *B. dysenteriae* within two hours [11] but in the stomach and the intestine, when mixed with secretions, these milks evidently lose some of their antiseptic power. It is possible that soured milk diets, even though they do not actually kill bacteria after ingestion, constitute a poor culture medium and that as a result, bacterial growth does not flourish.

SUMMARY

1. The presence of swallowed saliva or of regurgitated duodenal material is an important factor in reducing the gastric acidity of normal infants and of those convalescent from diarrhea and also in determining, to some extent, the types of organisms found in gastric cultures. Less than one third of the specimens of gastric contents of these infants were free from salivary or duodenal contamination.

2. Diets of some form of lactic acid milk increased the gastric acidity, but there was very little evidence that either these diets or the increased gastric acidity resulting therefrom destroyed many organisms in the stomach.

3. The acidity of specimens collected less than six hours after a meal was higher than that of the specimens obtained later. This difference may have been due to the fact that all of the specimens collected later than six hours after a meal contained saliva.

4. Elevation of the body temperature decreased the gastric acidity, but this change can possibly be explained by the frequency with which the gastric contents of febrile infants were contaminated with saliva.

5. The presence of vomiting increased the gastric acidity.

6. Practically no difference could be found in the reaction or cultures of the gastric contents of normal infants and of those convalescent from diarrhea.

7. As reported elsewhere [1] the more acid the gastric contents, the greater was the acidity of the duodenal contents obtained less than a half-hour later. The reaction of the gastric contents did not have any apparent relation to the amounts of duodenal amylase and trypsin. This observation apparently does not agree with the usual physiologic conception quoted by Marriott and Davidson [4] that the acidity of the gastric contents stimulates the flow of pancreatic juice, bile and intestinal secre-

tions. Duodenal cultures were more frequently sterile in infants whose gastric acidity was from p_H 5.1 to 5.7 than in those in whom it was from p_H 3.6 to 4.4.

8. No observations were made of the relationship of the psychic state of the infant and the results of the gastric analyses, but it is possible that any form of excitement may affect gastric secretion.

9. All of these factors should be taken into consideration before conclusions in regard to gastric secretion can be drawn from analyses of gastric contents in infants.

THE KIDNEY: A FILTER FOR BACTERIA

V. THE EFFECT OF NEPHROTOXINS ON THE KIDNEY FILTER FOR BACTERIA *

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In former experiments on rabbits, the complete failure to change the kidney so as to make it possible for bacteria in the circulation to pass readily into the urine, led us to try the effects of certain substances toxic to the kidney. The effects of mercuric chlorid and uranium acetate on the epithelium of the kidney, and of cantharidin on the glomeruli, were tested. It did not seem likely that injury to the epithelium would change the permeability of the kidney for bacteria, but it was possible that changes might occur in the endothelial lining of the capillaries, which would allow bacteria to pass rapidly into the urine.

TECHNIC

The toxins were allowed to act from twenty-four to forty-eight hours before the bacteria were given intravenously to the animals, and then a period from two to twenty-four hours elapsed before they were chloroformed. The technic for obtaining the urine was the same as in all of our experiments, namely, to take the urine from the chloroformed animal after carefully searing an avascular portion of the bladder. In all but one of the experiments, the bacteria used were staphylococci. Fourteen experiments were performed with mercuric chlorid, nine with uranium acetate and twelve with cantharidin.

Effect of Mercuric Chlorid.—One cubic centimeter of a 1 per cent. mercuric chlorid solution was given by mouth, except in seventy-two hour experiments, in which it was given intravenously. All but two animals, Rabbits 781 and 812, were injected twenty-four hours after receiving the mercuric chlorid. The latter two were injected after forty-eight hours. The urine was cultured in solid and in liquid mediums. As will be seen from Table 1, there was only a single positive experiment in four of the seven-hour group. The two in the six-hour group—one five-hour experiment and one four-hour experiment—gave negative results. A single twelve-hour experiment was

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* From the Section on Pediatrics, Mayo Clinic.

negative, and two of the twenty-four hour experiments gave positive results. The histologic changes were characterized by marked epithelial degeneration and necrosis. There were deposits of calcium in the necrotic tubules in most of the kidneys.

Effect of Uranium Acetate.—Two cubic centimeters of a 1 per cent. solution of uranium acetate was given to the rabbits by stomach tube. In six of the experiments, bacteria were injected after twenty-four hours, and in three after forty-eight hours. The interval between injection of the staphylococci and death of an animal varied from three and one-half to twenty-four hours. In all experiments the blood cultures were positive. The urine was cultured in solid and in liquid mediums; the three-hour, four-hour, five-hour and three seven-hour experiments, as well as the twelve-hour experiments, showed no growth in the urine cultures, but the two twenty-four-hour experiments gave definitely positive cultures in both mediums.

TABLE 1.—*Excretion of Bacteria Following Injury to the Kidney with Mercuric Bichlorid*

Rabbit	Mercuric Bichlorid	Days After Giving Mercury Before Injection of Staphylococcus	Hours After Injection of Bacteria Before Rabbit Was Killed	Urine Culture in Liquid and Solid Mediums	Blood Culture
791	1 c.c. 1 per cent. solution by mouth....	1	4	0	+
794	1 c.c. 1 per cent. solution by mouth....	1	5	0	+
795	1 c.c. 1 per cent. solution by mouth....	1	6	0	+
788	1 c.c. 1 per cent. solution by mouth....	1	6	0	+
789	1 c.c. 1 per cent. solution by mouth....	1	7	0	+
781	1 c.c. 1 per cent. solution by mouth....	2	7	0	+
966	1 c.c. 1 per cent. solution by mouth....	1	7	0	+
967	1 c.c. 1 per cent. solution by mouth....	1	7	+	+
A28	0.002 gm. (in 1 c.c. water) intravenously	1	7	0	+
812*	1 c.c. 1 per cent. solution by mouth....	2	12	0	+
940	1 c.c. 1 per cent. solution by mouth....	1	24	+	+
941	1 c.c. 1 per cent. solution by mouth....	1	24	+	+
A29	0.002 gm. intravenously.....	1	72	0	+
A31	0.002 gm. intravenously.....	1	120	0*	0

* Virulent Bacillus coli used instead of staphylococcus.

Effect of Cantharidin.—Twelve experiments were carried out with cantharidin. In three animals, 0.25 c.c. of 0.5 per cent. solution in oil was given by mouth; in one, 0.5 c.c. of 0.1 per cent. solution and in the remainder, 0.25 c.c. of 0.1 per cent. solution were given, all by mouth. All injections were made twenty-four hours after giving the cantharidin, at which time there were numerous red blood cells in the urine of all the animals. One animal which received 0.25 c.c. of the 0.5 per cent. solution was killed after three hours, the other two after four hours. Cultures of the urine in the three-hour experiment were negative; those in the two four-hour experiments with concentrated solution were positive. With the greater dilution and smaller

amount of the solution (0.25 c.c. of 0.1 per cent. solution), the cultures in the two four-hour experiments, the four seven-hour and one of the twenty-four-hour experiments were negative. The twenty-four hour experiment in which the urine was sterile also gave sterile blood cultures.

COMMENT

The histologic changes produced in the kidney by mercuric chlorid and uranium acetate were so marked that any further increase in the amount of toxin injected would probably have produced partial or complete anuresis. In fact, it is a question whether the negative result in some of the experiments was not due to cessation of secretion during the period of observation following the injection of the bacteria. So far as possible, this was controlled by the size of the bladder and a determinaion of the output during the previous twelve hours.

TABLE 2.—*Excretion of Bacteria Following Injury to the Kidney with 2 c.c. Uranium Acetate*

Rabbit	Organism Injected Intravenously	Days After Giving Uranium Acetate Before Injection of Bacteria	Hours After Injection of Bacteria Before Rabbit Was Killed	Urine Cultured in Liquid and Solid Mediums	Blood Culture	Remarks
804	Virulent staphylococcus	2	3½	0	+	Died from nephritis
790	Virulent staphylococcus	1	4	0	+	Not enough urine for microscopic examination
799	Virulent staphylococcus	1	5	0	+	Casts — 0
803	Virulent staphylococcus	2	7	0	+	Nephritis
968	Virulent staphylococcus	1	7	0	+	Nephritis
969	Virulent staphylococcus	1	7	0	+	Nephritis
807	Virulent staphylococcus	2	12	0	+	Nephritis
942	Virulent staphylococcus	1	24	+	+	Nephritis
943	Virulent staphylococcus	1	24	+	+	Nephritis

The experiments with mercuric chlorid and uranium acetate show that if they have any effect it is a tendency to retard the passage of bacteria, probably as a result of the decreased secretion. The cantharidin experiments, on the other hand, are of particular interest, because with sufficient irritation, as was obtained with a dosage of 0.25 c.c. of 0.5 per cent. solution, large amounts of blood were present in the urine and the normal filter was injured sufficiently to allow bacteria to pass through in four hours, although not in two or three. If, however, the dosage was somewhat reduced, there was still sufficient injury to the glomeruli to produce hematuria, but bacteria did not pass through the kidney filter in a period of seven hours. In one instance the urine was sterile after twenty-four hours. In the last experiment, however, the cultures of the blood were also sterile. It is of some interest that, with the larger doses of cantharidin and to a less extent with the smaller doses, a large number of animals were lost in the twenty-four hours before injection.

TABLE 3.—*Excretion of Bacteria Following Injury to the Kidney by Cantharidin*

Rabbit	Cantharidin	Days After Giving Cantharidin Before Injection of Virulent Staphylococcus	Hours After Injection of Bacteria Before Rabbit Was Killed	Urine Culture in Liquid and Solid Mediums	Blood Culture	Remarks
816	0.25 c.c. 1 per cent. solution by mouth	1	2	0	+	Numerous red blood cells in urine previous to injection of bacteria *
825	0.25 c.c. 0.5 per cent. suspension in oil by mouth	1	3	0	+	Numerous red blood cells in urine previous to injection of bacteria
813	0.25 c.c. 1 per cent. solution by mouth	1	4	+	+	Numerous red blood cells in urine previous to injection of bacteria
814	0.25 c.c. 1 per cent. solution by mouth	1	4	+	+	Numerous red blood cells in urine previous to injection of bacteria
832	0.5 c.c. 1:10 suspension (oil) 1 per cent. solution	1	4	0	+	Numerous red blood cells in urine previous to injection of bacteria
833	0.5 c.c. 1:10 suspension (oil) 1 per cent. solution	1	4	0	+	Numerous red blood cells in urine previous to injection of bacteria
834	0.25 c.c. 1:10 suspension (oil) 1 per cent. solution	1	7	0	+	Numerous red blood cells in urine previous to injection of bacteria
835	0.25 c.c. 1:10 suspension (oil) 1 per cent. solution	1	7	0	+	Numerous red blood cells in urine previous to injection of bacteria
970	0.25 c.c. 1:10 suspension (oil) 1 per cent. solution	1	7	0	+	Numerous red blood cells in urine previous to injection of bacteria
971	0.25 c.c. 1:10 suspension (oil) 1 per cent. solution	1	7	0	+	Numerous red blood cells in urine previous to injection of bacteria
944	0.25 c.c. 1:10 suspension (oil) 1 per cent. solution	1	24	0	0	Numerous red blood cells in urine previous to injection of bacteria
944	0.25 c.c. 1:10 suspension (oil) 1 per cent. solution	1	24	+	+	Numerous red blood cells in urine previous to injection of bacteria

* 1 c.c. staphylococcus 527 used in all experiments.

SUMMARY AND CONCLUSIONS

1. Injury to the kidney by mercuric chlorid or uranium acetate does not change the kidney filter for bacteria.

2. Cantharidin in large doses produces sufficient damage to allow bacteria to pass through the kidney in four hours. In smaller doses sufficient to produce definite hematuria, bacteria are held back for the usual period.

CALCIFICATION OF RACHITIC BONES IN VITRO*

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The basis of these experiments, which are designed to throw some light on the question of calcification, is the observation of Shipley made a year ago that the epiphyseal cartilage of rachitic rats when placed in the serum of rachitic rats does not calcify, but does calcify when placed in the serum of nonrachitic rats. Our experiments have been conducted in a number of different ways. To begin with, there are certain precautions that should be observed. The rats should be completely rachitic, that is, there must be no calcification whatever in their cartilages; they must be fed continuously up to the time that they are killed; they must be killed without anesthesia and the slabs of tissues, cut from the extremity of the bones, must not be too thin. Sterile precautions should be observed in the preparation and the handling of the solutions and of the cartilage.

The solutions were made up to simulate the inorganic composition of human serum, but the inorganic phosphate concentration, the protein and the calcium concentration have been varied. The solutions were filtered through Berkefeld candles and the final reaction adjusted by means of carbon dioxid. The process of calcification is essentially similar, whether it takes place in vivo or in vitro. The situation is the same; it is limited to the provisional zone and in this the deposit of calcium is between and not within the cells.

With the evidence that calcification regularly occurs in vitro under proper conditions, we could study the various factors that promote or retard calcification. We first used aqueous solutions.

The calcium was fixed at 10 mg. per hundred cubic centimeters and the inorganic phosphorus varied from 1 to 4 mg. The reaction was essentially the same. At the end of nine hours, there was nearly complete calcification in the specimen with 4 mg. of inorganic phosphorus and none in the others. We have been forced to set a time limit because calcification in the solutions containing 3 or even 2.5 mg. will occur, but only after many hours (from twenty-four to forty-eight). Other tables will show that it apparently makes little difference whether the calcium is low and the phosphorus high or the calcium normal and the phosphorus

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* Read before the American Pediatric Society, Washington, D. C., May, 1925.

nearly normal. Calcification occurs in either instance. Conditions being proper, calcification takes place throughout a wide range of reaction, from p_H 7.05 to 7.50.

When precipitation occurs in the solution, if this be before calcification has taken place, the concentration of the solution may be so much diminished as to prevent calcification. This automatically prevents calcification occurring in a strongly alkaline solution.

We then studied the effect of protein in 1 and 2 per cent. solutions. The protein used was egg albumin. This has a distinctly inhibiting effect on calcification, as Tables 3 and 4 show. One per cent. protein

TABLE 1.—*Calcification in Aqueous Solutions of Inorganic Salts*

Calcium	Phosphorus	Precipitate	Calcification	p_H	Temperature	Time, Hours
10	1.0	0	0	7.42	35	9
10	2.0	0	0	7.35	35	9
10	3.0	0	0	>7.45	35	9
10	4.0	0	+++	7.42	35	9

TABLE 2.—*Effect of Reaction on Calcification*

Calcium	Phosphorus	Precipitate	Calcification	p_H	Time, Hours
10.0	3.5	0	++++	7.05	24
10.0	3.5	0	++++	7.10	24
5.0	7.0	0	++++	7.0	24
5.0	7.0	0	++++	7.1	24
10.0	3.5	0	+++	7.48	24
10.0	3.5	0	+++	7.50	24

TABLE 3.—*Effect of Protein 1 Per Cent. on Calcification*

Calcium	Phosphorus	Precipitate	Calcification	p_H	Temperature	Time, Hours	Protein, Per Cent.
10	3.5	0	+++	7.4	36	16	0
10	3.5	0	++++	7.4	37	24	0
10	3.5	0	++++	7.36	36	48	0
10	3.5	0	0	7.4	37	16	1
10	3.5	0	0	7.38	37	24	1
10	3.5	0	0	7.3	36	48	1

will protect somewhat, while 2 per cent. protein protects against calcification for forty-eight hours in a solution in which this process would have occurred in at least six or eight hours. This failure of calcification is not the result of an injury to the cartilage for, if at the end of forty-eight hours the tissue is removed, washed and placed in an aqueous solution of the salts at the same concentration, calcification promptly occurs.

If anything is done to injure the tissue, calcification will not occur. It will not take place in the icebox but will when the preparation is raised to and maintained at body temperature. Protoplasmic poisons

entirely prevent calcification. Cyanid, alcohol, chloroform, ether, liquor formaldehydi, toluol, all have been used and all will prevent calcification even when the tissues have been removed from the poison and thoroughly washed. Boiling the tissue accomplishes the same result. It appears, therefore, that there is something more in the process of calcification than a mere precipitation, and that the situation of calcification and its character depend on the integrity of the tissue. Otherwise it would be hard to explain the exquisite localization of the calcification under the conditions of our experiments.

TABLE 4.—*Effect of Protein 1 and 2 Per Cent. on Calcification*

Calcium	Phosphorus	Precipitate	Calcification	p_H	Temperature	Time, Hours	Protein, Per Cent.
10	4.0	0	+++	7.3	36.5	19	0
10	4.0	0	+++	7.35	36.5	19	1
10	4.0	0	0	7.25	37	26	2
10	4.0	0	0	7.25	37	47	2
8	5.0	0	++++	7.45	36.5	7	0
8	5.0	0	0	7.2	37	42	2

TABLE 5.—*Calcification in Vitro with Human Serum*

Calcium	Phosphorus	Calcification	Time, Hours
	Nonrachitic Serum		
11.4	5.2	+	19
10.0	4.3	+	19
9.8	4.4	+	19
7.8	6.5	+	48
10.0	5.0	+++	20
	Rachitic Serum		
10.6	3.2	0	48
10.0	2.5	0	48
10.5	3.7	0	19

Finally, we have confirmed Shipley's observations, using the serum of children instead of that of rats. The cartilage calcifies in normal serum and not in the rachitic serum, as Table 5 shows. This is the result of the low concentration of the inorganic phosphorus in rachitic serum.

COMMENT

Calcification occurs in vitro apparently exactly as it does in vivo.

In aqueous solutions it occurs rather rapidly only when the concentration of the bone forming constituents is nearly that of normal serum. It is delayed by the addition of protein and completely inhibited by heat and by protoplasmic poisons.

INORGANIC CONSTITUENTS OF THE BLOOD IN NEPHRITIS OF CHILDREN *

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The inorganic constituents of the blood were determined while investigating certain phases of kidney disease in children. The material consisted of twelve cases seen in the wards and in the outpatient department. In three of these, determinations were made at various intervals so the figures in different stages of the disease could be compared. There were eight cases of chronic nephrosis, three cases of hemorrhagic glomerular nephritis and one case of nephritis with hypertension.[1]

In five cases whole blood was used and in seven, blood serum only.[2] In a case of nephritis with hypertension there was marked nitrogen retention. In the other cases there was either a moderate or no nitrogen retention.

Calcium.—There was no great variation of the blood calcium from normal figures in any of the cases. In those in which a lowered serum protein was evident, there was a slight decrease in the calcium content of the blood. This decrease in calcium has been observed by Salvesen and Linder [3] in the adult in this type of case.

Potassium.—The blood serum potassium was remarkably constant. Potassium in the whole blood varied somewhat, depending on the red blood cell and the serum volume ratio, for most of the potassium is in the red blood cells.

Sodium.—There was some variation within normal limits in the serum sodium. The sodium in the whole blood varies somewhat, but again this depends on the red blood cell and the serum volume ratio, as most of the sodium is in the serum.

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* Received for publication, April 14, 1925.

* From the Department of Pediatrics and Pathological Laboratory, Department of Physiological Chemistry, Mt. Sinai Hospital.

1. Methods used in the inorganic analysis were: Sodium, potassium and calcium, Kramer, B., and Tisdall, F. F.: J. Biol. Chem. **48**:223 (Sept.) 1921. Sodium chlorid, Wetmore, A. S.: J. Biol. Chem. **45**:113 (Dec.) 1920. Phosphorus, Briggs, A. P.: J. Biol. Chem. **53**:13 (July) 1922.

2. Normal values per hundred cubic centimeters: Sodium-whole blood, from 175 mg. to 216 mg.; sodium-serum, from 323 mg. to 344 mg.; potassium-whole blood, from 180 mg. to 202 mg.; potassium-serum, from 19 mg. to 20 mg.; calcium-whole blood, from 5.7 mg. to 6.7 mg.; calcium-serum, 10.0 mg.; sodium chlorid-serum, from 5.3 mg. to 5.7 mg.; inorganic phosphorus-serum, from 3 mg. to 5 mg.; serum-protein, 6.0 per cent.

3. Salvesen, H. A., and Linder, G. C.: J. Biol. Chem. **58**:617 (Dec.) 1923.

Findings in Twelve Cases

Case	Age, Years	Sex*	Diagnosis	Date	In 100 C.c. Whole Blood: Urea, Mg.	Non-protein Nitrogen, Mg.	Uric Acid, Mg.	Creatinin, Mg.	Cholesterol, per Cent.	In 100 C.c. Serum: Sodium Chlorid, Mg.	Inorganic Phosphorus, Mg.	Protein, per Cent.	In 100 Gm. Whole Blood: Calcium, Mg.	Potassium, Mg.	Sodium, Mg.	Symptoms and Remarks
1	2	♂	Nephrosis	6/ 9/23	11.2	....	...	...	0.160	6.0	..	4.55	5.5	195	289	Carbon dioxid, 55.7; marked edema; temperature of 101; died 6 days later
2	3½	♂	Nephrosis	12/23/22	14.0	....	...	...	0.318	...	...	4.53	6.0	252	295	Edema rapidly disappearing; stage diuresis
		♂	.....	3/ 9/23	11.2	....	...	...	0.239	...	...	4.55	5.5	...	290	Very little edema
3	12	♀	Nephrosis	8/ 8/23	16.0	....	...	...	0.328	5.5	...	3.3	6.0	280	228	Plasma volume: red blood cells, 41%; plasma, 59%; extreme generalized edema
4	9	♂	Acute hemorrhagic nephritis	12/11/22	23.8	49	2.3	1.0	.....	...	...	....	6.7	186	238	No edema; urine has many red blood cells after acute stage
5	13	♀	Hypertension, nephritis	2/ 5/23	85.4	126.7	4.5	4.5	.....	...	...	. ..	...	140	286	Carbon dioxid, 23.3; no edema; child very sick
					Per 100 C.c. of Serum											
6	3	♂	Nephrosis	9/23/23	14.0	...	...	...	0.340	...	...	4.2	7.5	19.5	260	Marked generalized edema
		♂	.....	11/ 8/23	14.0	....	...	...	1.16	...	...	3.4	7	22	285	Serum fat, 2.09%; marked generalized edema
		♂	.....	1/11/24	14.0	....	...	...	0.400	...	...	5.2	8.4	19	265	Very little edema
7	2	♂	Nephrosis	11/19/23	22.5	. ..	...	...	0.550	5.8	...	....	10	19.2	270	Marked edema
8	10	♂	Nephrosis	12/ 3/23	30.8	....	...	...	0.356	5.5	5	....	8	19	335	Edema disappearing; lost 7 pounds in 3 days
9	11	♂	Nephrosis	12/13/23	12.6	....	...	...	0.182	...	..	....	10	18	...	Return clinic case; no edema
10	2	♂	Nephrosis	1/13/24	14.0	...	...	...	0.242	5.6	5	....	10	20.6	310	Return clinic case; no edema
11	9	♂	Acute nephritis	12/16/23	18.2	34.1	5.5	1.6	0.224	5.4	...	....	9.6	19.8	260	Blood sugar, 0.294%; blood taken during a convulsion
		♂	.....	12/17/23	30.8	50	...	...	.....	5.3	...	....	10.6	20	330	Moderate edema day following convulsion
		♂	.....	1/16/23	18.2	46.4	...	...	.....	...	...	....	10	20	310	No edema; few red blood cells in urine
12	2½	♀	Acute nephritis	1/ 8/24	26	....	...	...	0.218	...	...	....	10	...	335	Moderate edema; passing small amount of smoky urine
				1/18/24	22.4	54.7	...	...	.....	...	..	....	10	19	320	No edema

* In this column, ♀ indicates female; ♂, male

Sodium Chlorid.—The sodium chlorid content of the blood varies but little from the normal and is never very low. In one case reported in a previous paper,[4] the serum sodium chlorid was 4.9 mg. per hundred cubic centimeters of blood, the normal value being 5.5 mg. per hundred cubic centimeters. At that time the child had no visible edema.

Inorganic Phosphorus.—The inorganic phosphorus was determined in only two cases, and was normal in both; in neither of these cases was there any nitrogen retention.

SUMMARY

It seems from these cases that the inorganic constituents of the blood remain fairly normal and constant. One patient showed about the same sodium, potassium and calcium content in the blood when there was marked edema, when the edema was disappearing or when it was no longer visible. The inorganic analyses of the blood from chronic nephrosis with or without edema or acute hemorrhagic nephritis show no marked differences in the inorganic salt content of the blood. One patient with hypertension with a marked nitrogen retention showed no variation from the normal so far as the sodium, potassium and calcium content were concerned.

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4. Schwarz, H., and Kohn, J. L.: Nephritis in Children, Am. J. Dis. Child. **24**:125 (Aug.) 1922.

GROWTH OF CHINESE*

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This study has been made to aid in the formulation of standard measurements of Chinese during the growth period. The determination of racial variation in relation to dietetic factors may also throw light on the problem of physical growth in general.

LITERATURE

A number of anthropometric studies of Chinese are to be found in the literature. Merrins,[1] in 1910, gave measurements of weight, height and other physical traits of 219 boys and sixty-nine girls, students in central China. The ages ranged from 11 to 22 years.

Whyte,[2] in 1918, in a report of the research committee of the China Medical Missionary Association, collected measurements of height, weight and circumference of chest of 1,741 healthy Chinese. He plotted height-for-age curves for 1,683 boys and 438 girls, aged from 10 to 19 years.

Cadbury,[3] in 1922, reported measurements of height, weight and circumference of chest of 121 male students from 20 to 36 years old.

Shirokogoroff and Appleton,[4] in 1924, gave the height, weight and weight-height index of 873 boys from 3 to 20 years of age, and of 266 girls, aged from 3 to 18 years, and the calculated formulas to express growth in height and in weight.

Appleton,[5] in 1925, reported the height, weight and weight-height index of 345 male students in Fukien province in China, and of 524 Chinese boys in Hawaii.

Cox [6] has given height and weight for boys and girls from 6 to 14 years of age for five race groups in Hawaii. The Chinese group is made up of 282 boys and 296 girls.

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* Received for publication, April 24, 1925.

1. Merrins, E. M.: Anthropometry of Chinese Students, China, M. J. **24**: 318 (Sept.) 1910.
2. Whyte, G. D.: Height, Weight and Chest Measurements of Healthy Chinese, China M. J. **32**:210 (May) 1918.
3. Cadbury, W. W.: Height, Weight and Chest Measurements of the Chinese, National M. J. **8**:158 (Sept.) 1922.
4. Shirokogoroff, S. M., and Appleton, V. B.: Growth of Chinese, China M. J. **38**:400 (May) 1924.
5. Appleton, V. B.: Further Study of the Growth of Chinese. Read at the Joint Conference of the China Medical Missionary Association and the British Medical Association, in Hong Kong, January, 1925.
6. Cox, I. M.: Do We Need a Yellow Yard Stick? Hawaii Educational Rev. **8**:150 (March) 1925.

Anthropologic studies have been made by Shirokogoroff [7] for men in Northern China.

PROBLEM

Relative and absolute measurements of head, trunk, legs, arms and sitting height have not been established for Chinese children and women. To formulate standards and to determine changes which take place during the growth period is the purpose of the present study.

PROCEDURE

Subjects.—Two hundred and twenty-four girls, aged from 6 to 22 years, were measured and examined for physical traits related to growth and development. These girls were students in two cities in Chekiang province, east China. Every girl in the elementary, grammar and high school in each of two schools was examined. These are boarding schools, but day pupils also attend. In most instances the boarders were found to be in better physical condition, a fact probably due to the more regular life and the better hygienic conditions.

Instruments.—The measurements were taken with instruments consisting of an anthropometer and calipers. The anthropometer is a measuring rod with an adjustable cross bar which rides easily up and down or across. The rod was held in position in a block attached to the board on which the subject stood or sat while being measured.

Measurements.—The points on the trunk, limbs and head were taken according to the list of measurements selected by the International Commission in Geneva in 1912. Not all of the points on the head and none of those on the face were taken, as they were considered to be of anthropologic interest and not important in the study of growth.

Points taken with the anthropometer were: (1) Stature; (2) height above the floor of the suprasternal notch; (3) height of the acromion process of the scapula; (4) height of the upper edge of the radius; (5) height of the tip of the styloid process; (6) height of the tip of the middle finger; (7) height of the upper edge of the great trochanter; (8) height of the knee joint; (9) sitting height.

Measurements taken with the calipers were: (1) Maximum length of head; (2) maximum breadth of head.

All measurements were taken by me, so the technic was uniform. A single layer of light undergarments was worn when the weights were taken. Arm and leg measurements are for the left side.

Other Physical Traits.—A physical examination was made to determine traits related to growth and development. The menstrual history

7. Shirokogoroff, S. M.: Anthropology of Northern China, Vol. 2, Shanghai, The North China Branch of the Royal Asiatic Society, 1923.

was inquired into. The development of breasts was noted, also the presence of pubic hair. Teeth were examined, and the general nutritional condition was noted.

The general nutritional condition was classified as good, fair or poor. The points taken into consideration were: (1) subcutaneous fat, (2) bones, and (3) muscles.

Depressions above and below the clavicle or in the intercostal spaces were considered evidence of a subnormal amount of subcutaneous fat.

Ordinary inspection seldom reveals evidence of rickets in the extremities of Chinese children. Indeed, until recently, when roentgen-ray examination was made of the bones, rickets was thought to be a rare disease among Chinese. Deformities of the chest, however, are extremely common in school children as well as in those of preschool age. This is undoubtedly the result of poor bone development due to faulty diet but the condition may not be true rickets.

Muscles proved to be least reliable in judging nutritional condition because so many varying factors are involved. Physical exercise is less popular with orientals than with occidentals. Flabby muscles causing stooped shoulders and flaring scapulas are usually considered more important than palpably flabby muscles in the arms, but time honored social custom has made stooped shoulders the approved posture in China.

Age.—For this series, age has been calculated accurately according to the western method for counting age, so these data may be compared with those for European races. This has not been true of many of the data previously published, and may account in part for variations which have been considered racial differences. According to Chinese custom, a child is counted 1 year old at birth and then an additional year is added to the age on each lunar Chinese New Year, not on the child's birthday. Thus a child born in January before Chinese New Year is said to be 2 years old when he has lived only about 1 month, while a child born in March after Chinese New Year is nearly 11 months old before he is said to be 2 years old. The correct age can be calculated accurately if the Chinese age and the month of birth are known.

Diet.—Cereals play an important rôle in the diet of Chinese. In the North, wheat is the staple cereal; in Shansi province, millet; along the Hwai river and a little northward, rice and wheat are of nearly equal importance; and south of the Yangtze River and along its banks, rice makes up the bulk of the diet. Chekiang is in this rice eating region. At each meal a person eats two or three bowls of rice with smaller quantities of three or four kinds of vegetables. These vegetables, except at the morning meal, are cooked with small amounts of meat, fish and bean curd, or more rarely, with eggs. In general, this was the diet of the girls examined.

RESULTS

Table 1 gives, according to age, the average of absolute measurements of stature, sitting height, trunk, length of arm, upper arm, forearm,

TABLE 1.—*Absolute Measurements. Average for Age in Kilograms and in Centimeters*

Age	Number of Cases	Weight	Stature	Sitting Ht.	Trunk	Arm	Upper Arm	Forearm	Hand	Leg	Thigh	Ht. of Knee Joint	Max. Head Length	Max. Head Breadth
6	5	20.48	114.22	63.28	38.30	45.50	14.52	14.34	12.64	53.70	24.88	28.82	17.06	14.18
7	8	21.96	120.80	65.54	39.90	47.66	19.14	15.25	13.25	58.85	28.65	30.20	16.70	14.12
8	12	22.58	121.70	64.92	38.73	48.72	19.95	15.57	13.21	59.84	29.47	30.37	16.86	14.27
9	13	24.24	125.48	66.19	39.44	51.91	21.08	16.48	14.35	62.43	30.38	32.05	16.71	14.35
10	15	28.34	130.01	68.63	41.39	52.78	21.55	16.96	14.27	66.31	33.20	33.11	17.03	14.20
11	15	32.60	139.80	73.21	44.64	57.71	23.41	18.41	15.89	70.77	34.65	36.11	17.33	14.40
12	16	31.83	137.79	71.69	43.91	57.26	23.43	18.21	15.62	69.34	34.12	35.34	16.96	14.36
13	19	40.03	147.56	75.99	46.96	61.55	25.27	19.88	16.40	74.76	36.35	38.40	17.27	14.68
14	14	40.43	148.37	77.36	47.55	62.02	25.63	19.68	16.71	74.05	35.95	38.14	17.63	14.50
15	34	43.96	151.20	79.71	49.27	63.48	26.01	20.28	17.19	76.01	36.95	39.06	17.53	14.74
16	18	47.45	152.42	81.62	51.00	63.07	25.53	20.54	16.99	76.27	37.55	38.69	17.72	14.54
17	23	48.19	153.81	81.69	51.49	64.23	26.39	20.53	17.31	76.87	37.02	39.43	17.73	14.75
18	15	50.93	157.46	83.17	52.95	66.26	27.23	21.98	17.25	79.02	38.05	40.97	17.75	14.96
19	13	47.15	154.28	82.08	52.23	63.72	26.45	20.78	16.49	76.99	37.46	39.53	17.84	14.88
20 or more	4	49.61	152.39	81.42	51.22	63.02	26.37	20.10	16.55	76.00	37.35	38.65	17.40	15.00

hand, length of leg, thigh, height of knee, maximum length of head and maximum breadth of head.

Relative measurements have been calculated and are represented by Table 2, in which are given cephalic index, weight-height index and

TABLE 2.—*Relative Measurements*

Age	No. of Cases	Weight-Height Index	Weight-Sitting-Height Index	Relative Arm to Height	Relative Leg to Height	Relative Trunk to Height	Upper Arm to Arm	Forearm to Arm	Hand to Arm	Thigh to Leg	Cephalic Index
6.....	5	0.1791	0.3236	39.83	46.95	33.55	40.74	31.51	27.75	46.23	83.50
7.....	8	0.1815	0.3345	39.46	48.60	33.06	40.16	32.03	27.70	49.23	84.68
8.....	12	0.1853	0.3476	40.03	49.17	31.81	40.94	31.93	27.13	49.23	84.68
9.....	13	0.1925	0.3654	41.38	49.72	31.42	40.64	31.72	26.64	48.66	85.95
10.....	15	0.2065	0.3905	40.58	50.98	31.83	40.83	32.13	27.04	49.94	83.47
11.....	15	0.2296	0.4382	41.91	50.61	31.88	40.55	31.91	27.54	48.94	83.13
12.....	16	0.2300	0.4421	41.51	50.33	31.89	40.88	31.81	27.31	49.22	84.78
13.....	19	0.2708	0.5257	41.71	50.64	31.84	40.95	32.27	26.67	48.61	85.08
14.....	14	0.2719	0.5215	41.79	49.91	32.01	41.32	31.73	26.95	48.52	82.47
15.....	34	0.2904	0.5511	42.01	50.26	32.57	40.98	31.94	27.08	48.60	84.25
16.....	18	0.3108	0.5806	41.37	50.03	33.47	40.47	32.56	26.97	49.20	82.11
17.....	23	0.3130	0.5895	41.76	49.63	33.48	41.06	31.96	26.97	48.26	83.23
18.....	15	0.3227	0.6107	42.07	50.17	33.64	41.09	32.87	26.04	48.15	84.41
19.....	13	0.3050	0.5745	41.31	49.88	33.89	41.51	32.61	25.88	48.65	83.43
20 or more	4	0.3260	0.6001	41.41	49.94	33.69	41.82	31.89	26.29	49.05	83.74

weight-sitting height, arm-height, leg-height and trunk-height indexes. The relative length of the upper arm to the total length of the arm, of the forearm to the total arm, of the hand to the total arm and of the thigh to the leg are also given.

In Table 3, other physical traits in the percentage of the total number of cases in which the trait is present for each age group are given.

TABLE 3.—*Percentage of Total Number in Which Physical Traits Are Present*

Age	Nutritional Condition: Good or Fair	Nutritional Condition: Poor	Poor Bone Development	Breast Development	Menses
6	20.0	80.0	60.0	....	....
7	37.5	62.5	50.0	....	....
8	58.3	41.7	25.0	....	....
9	38.5	61.5	53.8	7.7	....
10	53.3	46.7	46.6	13.3	....
11	46.6	53.3	26.6	73.3	....
12	50.0	50.0	43.1	56.2	....
13	78.9	21.1	....	100.0	57.9
14	92.8	7.2	....	100.0	57.1
15	82.3	17.7	2.9	100.0	97.0
16	72.3	27.7	11.0	100.0	94.5
17	95.6	4.4	....	100.0	100.0
18	100.0	....	....	100.0	100.0
19	92.3	7.7	....	100.0	100.0
20 or more	100.0	....	....	100.0	100.0

CONCLUSIONS

Cephalic Index.—Maximum length of head and maximum breadth of head continue to increase up to adult life. This shows that the brain of a Chinese girl continues to grow after adolescence. Growth in maximum length of head is accelerated between the thirteenth and the fifteenth year. Cephalic index consequently is higher before this period than it is afterward. The cephalic index does not appear to become stable until about the eighteenth year when the adult measurement appears to be reached. From this the cephalic index for women in east China seems to lie between 83 and 84. This is higher than the figures of Shirokogoroff for adult men in north China, and corresponds more nearly to his figures for Manchus and Koreans. He gives 80.17 as cephalic index for Chinese, 83.52 for Manchus and 83.69 for Koreans.

Stature.—Annual increase in height is accelerated from the tenth to the thirteenth year, and is less rapid after 14 years of age, but growth in stature continues at least until the eighteenth year.

East China girls are taller for their age than girls in central China, reported by Merrins, and girls in south China, reported by Whyte. The difference is fairly constant for all ages, and may be due to difference in method of calculating age, as is true of part of the girls in my earlier series of cases. Cox's measurement of Chinese girls in Hawaii corresponds very closely to the present series in regard to height for the ages from 6 to 13, but the 14 year old group in Hawaii is taller.

Sitting Height.—From 6 to 9 years of age the annual increase in sitting height is very slight. After 9 and up to 18 it is greater, but shows no preadolescent acceleration.

Trunk.—Growth of length of trunk corresponds to that of sitting height. Trunk-height index is less each year from 6 to 8. From 8 to 13 it remains constant and after 13 increases again, most rapidly before 16.

Leg.—Growth of length of leg does not appear to be complete until 18 or 19 years of age, but is very slow after 15 and is most rapid between 6 and 11. While growth of length of leg is rapid between 6 and 11, growth of length of trunk is almost at a standstill between 6 and 9, so during this period growth in stature is due almost entirely to growth of length of leg. Up to 10, leg-height index increases with the age. It reaches its maximum at 10 and after 10 falls very gradually. Trunk-height index, on the contrary, decreases steadily up to 9 years of age, then remains constant until 13 and after 13 increases, rapidly at first, and after 16 slowly. The relationship between length of thigh and total length of leg remains constant throughout.

Weight.—Annual increase in weight is greatest from 9 to 16 years of age. This preadolescent acceleration in growth in weight precedes that of growth in height and continues over a longer period.

The weight of Chinese girls in Hawaii given by Cox, like height, corresponds very closely to the present series.

Weight-height index and weight-sitting height index increases steadily with the age from 6 to 18. Curves representing this increase tend to be concave under 13 years of age and convex after 13.

Arm.—Length of arm increases very little after 15. Merrins observed that the hand had reached its maximum growth at 15. Relative length of upper arm, forearm and hand, as compared with total length of arm, remains nearly constant from 6 to 17 years. Relative length of hand appears to be a little lower for the adult.

Whereas leg-height and trunk indexes for the older age groups approach closely the figures of Shirokogoroff for adult Chinese men in northern China, arm-height index brings out a difference between the two. The arm-height index of adult women in east China appears to be less than 42, while it is 43.75 for men in north China. The upper arm is also relatively longer and the hand relatively shorter for men. These differences are probably variations between two different anthropologic groups rather than a difference between the sexes because the cephalic indexes also differ.

Nutritional Condition.—Only two age groups under 13 years of age show less than 50 per cent. poorly nourished. These are the 8 year old group which had 42 per cent., and the 10 year old group which had 47 per cent. A larger proportion of the undernourished children under 12 years of age show poor bone development of the chest, varying in degree from a slightly depressed groove around the lower part of the chest to a deep groove with flaring margin of the ribs and pigeon breast. It is evident that the Chinese diet is not perfectly balanced.

Adolescence.—The 13 year old group is the earliest from which a history of the establishment of menses was elicited. It is probable

that it occurred earlier in a few children. The most common age for its establishment appears to be from 13 to 15. Breast development begins about two years earlier than the beginning of menstrual activity. The first signs of breast development were observed in the 9 year old group. It is evident that adolescence is not as much later in the Chinese as is frequently assumed.

The Chinese are a race with scant beard and with little hair on the body. Chinese women are said to lack pubic hair. In the present series, pubic hair was not observed in any girl under 16 years of age. At 16 a scanty amount was present in 27.7 per cent. of the cases, at 17 in 47.8 per cent., at 18 in 46 per cent., at 19 in 46.1 per cent., and at 20 years in 50 per cent.

Teeth.—Merrins reported teeth to be defective in 35 per cent. of his cases. Bolt,[8] among 685 Tsing Hua college students, found only 90 who had poor teeth. He classified the teeth of twenty-nine as excellent and of 508 as good or fair. I reported the presence of dental caries in 272 out of 699 Chinese children in China, and 300 out of 383 Chinese children in Hawaii.

In the present series, 66 per cent. had good teeth, 17 per cent. had one tooth either decayed or already lost, 12 per cent. had two teeth decayed or lost, and 5 per cent. had three or more teeth decayed or lost. The number of decayed teeth has been taken for the entire number of cases rather than according to age groups, because I found that when 699 Chinese children in China were arranged according to age, 14 per cent. of the 3 year old group, 25 per cent. of the 4 year old group and 43 per cent. of the 5 year old group had decayed teeth, while after 5 years of age, the percentage varied irregularly but never dropped lower than 29 per cent. nor went above 54 per cent.

Irregular and supernumerary teeth are much more common in Chinese than in European races. Twenty-seven out of 224, that is, 12 per cent., had strikingly irregular teeth. This suggests a physiologic racial difference in development of teeth which is not due to difference in diet.

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8. Bolt, R. A.: A Plea for More Systematic Medical Inspection and Physical Examination of Chinese Students, China M. J. **27**:208 (July) 1913.

VENTRICULAR ESCAPE

REPORT OF AN UNUSUAL CARDIAC RHYTHM IN A CHILD *

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Ventricular escape is described by Lewis [1] as that condition in which the impulse formation in a new rhythm center (namely, the auriculo-ventricular node or the idioventricular center) exceeds the rate at which impulses are received at that center from outside, the heart responding in part or in whole to this new center. This set of conditions may conceivably arise either from a depression of the sino-auricular node or from an excitation of the new center in the ventricle.

With the increasingly widespread use of graphic methods in the study of the heart beat, many abnormalities of cardiac rhythm have been frequently and successfully investigated in the adult. This is probably less true of the arrhythmias of childhood. A report of an unusual cardiac rhythm in a child is presented here.

REPORT OF CASE

W. S., a boy, aged 11 years, was brought to the University Hospital, Jan. 23, 1924, for the treatment of "rheumatism."

History.—The past history was unimportant except for an attack of joint trouble one year before admission. The present illness began four weeks before admission, with pains in the legs, tender and swollen feet and sore throat. About one week later, as the condition of the feet cleared up, both the shoulders and the wrists became tender and swollen. Profuse sweats occurred on two occasions. The joint condition had greatly improved just before admission to the hospital.

Physical Examination.—The outstanding findings noted were several small herpetic lesions around the mouth, badly decayed teeth, large scarred tonsils adherent to reddened anterior faucial pillars, the liver palpable at 4 cm. below the right costal margin and tenderness but no swelling of both ankles.

Heart: The apex beat was in the fifth interspace; the right border of cardiac dulness was 1.5 cm. and the left border was 8.5 cm. from the midsternal line. There was a booming first sound with a soft blowing systolic murmur at the apex. A low pitched mid-diastolic murmur was heard best just inside the apex beat. The pulmonic second sound was accentuated. The rhythm was normal except for sinus arrhythmia and for one premature beat about every one and one-half minutes. The cardiac rate was 92. The blood pressure was 87 systolic and 55 diastolic in millimeters of mercury.

Laboratory Data.—The specific gravity of the urine in the 24 hour specimen varied from 1.010 to 1.025 with no sugar, no albumin or abnormal microscopic

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* Received for publication, April 15, 1925.

* Reported through the courtesy of Dr. Lawrence T. Royster, from the Department of Pediatrics of the University Hospital.

1. Lewis, Thomas: The Mechanism and Graphic Registration of the Heart Beat, London, Shaw and Sons, 1920.

findings; the hemoglobin was 78 per cent. (Dare); the red blood count was 4,000,000; the white blood count was 14,400; the differential blood count was normal, and the blood Wassermann reaction was negative.

Diagnosis.—Rheumatic fever; rheumatic heart disease with mitral stenosis.

Medication.—Ten grains of acetylsalicylic acid four times daily were given on January 23 and 24 only.

The patient entered the hospital with a temperature of 99.6 F., but this fell to normal the following day without subsequent rise. The pulse varied from 60 to 98, averaging 75 for the entire stay.

January 24, a marked change of cardiac rate with respiratory phases was noted. This was thought to be sinus arrhythmia. An electrocardiogram was taken.

January 29, the sinus arrhythmia was marked. Electrocardiograms were taken before and after small doses of atropin with normal and with forced breathing.

February 8, the boy was up and around without joint pains or tenderness. Tonsillectomy was not permitted by his mother, and the patient was discharged.

Feb. 15, 1925, a letter was received from the mother stating that the patient had been in good health during the entire year following discharge from the hospital, without joint pain or heart symptoms.

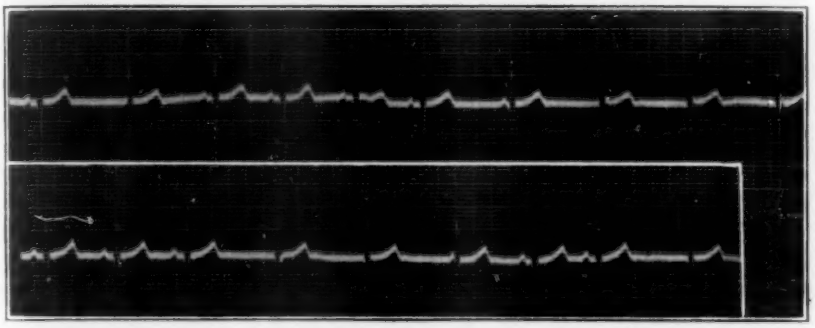

Fig. 1.—Escape of the ventricle during the sinus slowing of expiration.

In Figure 1 (Lead I), escape of the ventricle occurs in the second, seventh, eighth, ninth and tenth beats, apparently dependent on the lengthened diastolic pauses of the sinus slowing of expiration. Following the Q-R-S of the eighth, and to a lesser degree the ninth and tenth, there is an upward deflection, probably a P wave. The ventricular rate during inspiration is about 75 per minute and about 50 per minute during expiration. In Figure 1 (Lead II) the fourth, fifth, sixth and ninth beats show ventricular escape.

The unusual nature of the first tracing did not come to my attention until several days after it had been taken. Subsequent electrocardiograms five days after this failed to show the abnormal rhythm. Forced respiration was tried without avail. However, after a small dose of atropin, plus forced expiration, one escaped ventricular beat occurred in a long tracing although numerous other attempts were made at this

time to produce the condition (Fig. 2). Wilson [2] has already suggested that the vagal endings in the auriculoventricular node are released by atropin before those in the sino-auricular node. Sinus slowing was marked in this tracing, the rate during inspiration being about 90 and the rate during forced expiration about 55.

REVIEW OF THE LITERATURE

Clinical examples of simple ventricular escape, in which the ventricular rate does not exceed the auricular, have been found fairly frequently in the literature of the last twenty-three years. In 1902, Mackenzie [3] studied the first instance with jugular and radial tracings, in a police sergeant, aged 40, occurring eight weeks after an attack of influenza. There was marked shortening of the a-c interval following the long diastolic pauses occasioned by the dropped ventricular beats of partial auriculoventricular heart block (Fig. 4, Mackenzie's article).

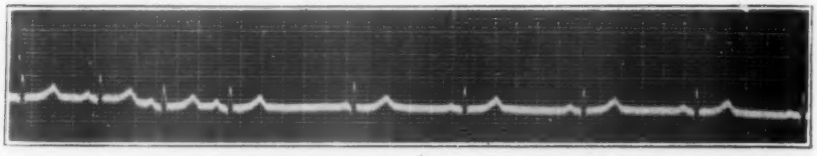

Fig. 2.—One hour after atropin sulphate subcutaneously. One ventricular escaped beat during forced expiration.

Wenkebach [4] published excellent radial, jugular and cardiogram tracings of a somewhat similar nature in 1908. This was also an example of partial auriculoventricular heart block with dropped ventricular beats followed by ventricular escape, occurring in a woman, aged 35, with chronic nephritis accompanying uremic symptoms and heart failure. During the same year Joachim [5] presented carotid, venous and radial tracings on a child, aged 14 years, with subacute rheumatic fever and mitral regurgitation; single escape of the ventricle followed sino-auricular block. Rihl [6] also contributed an instance of three successive escapes of the ventricle following vagus pressure.

Wilson's [7] case (Case 1), with escape of two successive ventricular beats during expiration, is quite similar to the case reported here. This took place in a young woman, aged 28, with mitral stenosis and rheumatic

2. Wilson, F. N.: The Production of Atrio-Ventricular Rhythm in Man After the Administration of Atropin, Arch. Int. Med. **16**:989-1007 (Dec.) 1915.
3. Mackenzie, J.: Brit. M. J. **2**:1411-1413, 1902.
4. Wenkebach, K. F.: Arch. f. Anat. u. physiol. (physiol. Abth.) Suppl. **53**:86, 1908.
5. Joachim, G.: Berl. klin. Wchnschr. **45**:911-913, 1908.
6. Rihl, J.: Deutsch. Arch. f. klin. Med. **94**:286-307, 1908.
7. Wilson, F. N.: Three Cases Showing Changes in the Location of the Cardiac Pacemaker Associated with Respiration, Arch. Int. Med. **16**:86-97 (July) 1915.

fever. White [8] discussed the subject of ventricular escape in 1916, the major portion of his article dealing with a discussion of the rarer form in which the ventricular rate exceeded the auricular rate. He included one tracing similar to mine, showing three successive escapes of the ventricle with the sinus slowing of forced expiration. No case reports were given. One of Levine's [9] cases of sino-auricular block, a woman, aged 56, with hypertensive heart disease, at one time (Fig. 7, his article) showed ventricular escape with sinus arrhythmia.

Heard and Colwell's [10] case arose in a man, aged 61, with arteriosclerotic heart disease and previous complete dissociation on several occasions. After 8 c.c. tincture of digitalis and 4 mg. strophanthin, ventricular escape was noted in one tracing every fourth cycle. Partial auriculoventricular block was present but there was no sinus slowing with expiration.

Brown [11] has reported the youngest case in a boy, aged 11 years, with rheumatic fever on admission to the hospital but with no valvular heart lesion. Electricardiographic tracings from day to day showed sino-auricular block, which could be abolished by atropin administration. On the fifteenth day, ventricular escape occurred spontaneously after each of the longer diastolic pauses occasioned by sino-auricular block. This was transient and appeared in none of the subsequent tracings.

Edens [12] has described two interesting cases, one in a shoemaker, aged 30, with a somewhat doubtful rheumatic history, with no definite organic heart disease by physical signs and with ventricular escape present with sinus slowing and following vagal pressure. The other patient was a man, aged 40, with cardiac enlargement and a previous rheumatic history. Ventricular escape appeared in him forty-five minutes after the injection of epinephrin. Neither case exhibited more than two successive escapes of the ventricle. The case of a woman, aged 23, convalescent from pneumonia and showing marked sino-auricular block with ventricular escape has been recorded by Poulton.[13] Lewis [1] gives four clinical instances of the simpler form of ventricular escape without case reports.

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8. White, P. D.: Ventricular Escape with Observations on Cases Showing Ventricular Rate Greater than that of Auricles, Arch. Int. Med. **18**:244-249 (Aug.) 1916.

9. Levine, S. A.: Observations on Sino-Auricular Heart Block, Arch. Int. Med. **17**:153 (Jan.) 1916.

10. Heard, J. D., and Colwell, A. H.: A Study of a Case of Intermittent Complete Dissociation of Auricles and Ventricles Presenting Unusual Features, Arch. Int. Med. **18**:758 (Dec.) 1916.

11. Brown, N. W.: Sino-Atrial Heart Block in a Child, Arch. Int. Med. **24**:458 (Oct.) 1919.

12. Edens, E.: Deutsch., Arch. f. klin. Med. **136**:207 (June) 1921.

13. Poulton, E. P.: Guy's Hosp. Rep. **71**:253 (July) 1921.

Pardee [14] gives a tracing in his book quite similar to mine. In a summary of the examples accompanied by case reports, it may be said that ventricular escape has been reported at varying ages, in many types of heart disease or with no proved organic heart disease. In the majority of instances organic heart disease has been present.

COMMENT

The exact nature of the mechanism of the heart beat as shown in Figure 1 cannot be stated without some reservation. Apparently with the sinus slowing of expiration, either the auriculoventricular node or the idioventricular center escapes and becomes the pacemaker of the ventricle, the auricle still responding to the sino-auricular node. With the increase in sinus rate during inspiration, the sino-auricular node regains control as pacemaker for the heart. As Lewis [1] has pointed out, one cannot always be certain which is the escaping ventricular center. In this instance the auriculoventricular node seems more likely. One further possibility arises with regard to the P waves. They may become iso-electric during expiration, as in Wilson's [15] case. In this case, however, there was no shortening of the P-R interval at the beginning or end of expiration.

The cause of this transient imbalance of the two centers, the sino-auricular node and the escaping ventricular center, is problematic. Whether a vagal effect alone on the sino-auricular node, or whether this node be rendered temporarily more susceptible to vagus effect by rheumatic infection remains undetermined. Possibly also the escaping ventricular center may have become temporarily more irritable. It seems highly probable that the active rheumatic infection at the time of entrance to the hospital contributed to the temporary disturbance of the normal cardiac mechanism.

This form of arrhythmia is probably more frequent in childhood than the literature indicates.

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14. Pardee, H. E. B.: Clinical Aspects of the Electrocardiogram, New York, Paul B. Hoeber, 1924.
15. Wilson, F. N.: Footnote 7.

RELAPSES IN MEASLES

REPORT OF THREE CASES, ONE TREATED WITH CONVALESCENT MEASLES SERUM *

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One attack of measles almost always, but not invariably, confers immunity. Although second attacks undoubtedly occur, they are very rare. In their extensive experiences, Loos,[1] Widowitz,[2] and Panum [3] did not observe a single instance in over 7,000 cases. A sufficient number of definitely authenticated cases of second attacks has been reported, however, to prove the occasional occurrence.

ETIOLOGY

Second attacks of measles are classified as either recurrent or relapsing. In relapses, the disease recurs with all the classical signs and symptoms in from one to four weeks after the attack is apparently over, but while the original infection is still present in the system. In recurrent attacks, the disease recurs months or years later.

REVIEW OF THE LITERATURE

Maizeles,[4] in an extensive review of the literature, collected 103 cases of recurrent measles. Ruhräh,[5] Barthez and Sannée,[6] Feer,[7] Kerley,[8] and Lewy [9] have reported single instances of recurrent measles. Relapsing measles is encountered with even greater rarity than the

* Received for publication, April 14, 1925.

* From the Department of Pediatrics, University and Bellevue Hospital Medical College, and the Willard Parker Hospital.

* Presented before The Bronx Pediatric Society, Oct. 8, 1924.

1. Loos, J.: Repeated Attacks of Measles: Wien. klin. Wchnschr. **39**: 981, 1924.

2. Widowitz: Wien. klin. Wchnschr. **22**:1595, 1909.

3. Panum, quoted by Ruhräh: Osler-McCrae, Modern Medicine, Ed. 2, Vol. 1, Philadelphia, Lea & Febiger, 1913, p. 898.

4. Maizeles: Virchow's Arch. f. path. Anat. **137**:468, 1894.

5. Ruhräh, John: Osler-McCrae, Modern Medicine, Ed. 2, Vol. 1, Philadelphia, Lea & Febiger, p. 898.

6. Barthez and Sannée, quoted by Ruhräh: Footnote 5.

7. Feer, E.: Feer's Pediatrics (Sedgwick-Scherer), Ed. 1, Philadelphia, J. B. Lippincott Company, p. 599.

8. Kerley, C. G.: The Practice of Pediatrics, Ed. 2, Philadelphia, W. B. Saunders Company, 1918, p. 622.

9. Lewy, B.: Repeated Attacks of Measles, Ztschr. f. Kinderh. **26**:160, 1920.

recurrent infection. Ker [10] and Carballeira [11] report single instances in which typical attacks of measles were followed seven and eleven days later by repetitions of the disease with equally classical symptoms.

Many cases diagnosed as second attacks of measles are undoubtedly erroneously diagnosed. The reappearance of one symptom alone, usually a rash, does not by itself constitute a recurrence or a relapse. A sign as pathogomonic as Koplik spots should be identified before one hazards the diagnosis of a second attack.

The three cases of relapsing measles reported here were identical both in severity and duration to the original attacks. Case 3 is of particular interest, since it involved the use of convalescent measles serum.

CASE REPORTS

CASE 1.—*History.*—O. S., a boy, aged 8 years, seen in consultation with Dr. Jacob Berkman on June 13, 1924, had had a severe attack of measles (with all the clinical signs and symptoms present) four weeks before, and had been confined to bed for three weeks after the fever and the rash had subsided, because of persistent cough and conjunctivitis. The child had been out of bed for five days (twenty-five days after the onset of the original infection) when the temperature again rose suddenly, accompanied by coryza, cough and conjunctivitis. These symptoms grew progressively worse for four days, when a maculopapular rash appeared behind the ears and on the chest and back. Koplik spots were seen in abundance. Spots were observed also on the caruncles of both eyes.[12] The child recovered.

CASE 2.—*History.*—M. S., a boy, aged 6 years, admitted to the Measles Pavilion of the Willard Parker Hospital, June 1, 1924, on admission had cough, coryza and conjunctivitis, fever and a generalized maculopapular rash. He made an uneventful recovery, but was kept in bed because of a discharging ear. Seventeen days after admission, the patient's temperature rose, and cough, coryza, conjunctivitis, Koplik spots, spots on the caruncles, and finally, a generalized maculopapular rash developed. The patient recovered.

CASE 3.—*History.*—C. L., aged 3 years, had been exposed to measles on July 3, 1924, and was immediately given 6 c.c. of convalescent measles serum. On July 14, the child developed fever, cough, coryza and conjunctivitis, all of a mild character. On July 19, the catarrhal symptoms were followed by Koplik spots (confirmed by three physicians) and a generalized maculopapular rash of an intense character. The child made an uneventful recovery. August 1 (less than ten days after the disappearance of the rash), the temperature again rose to 102 F., and continued at that point for five days, during which time the child had severe cough, coryza and conjunctivitis. Definite Koplik spots were again observed by three colleagues. The maculopapular rash was intense. With the relapse, the child had complicating bronchitis which lasted for seven days.

2562 Grand Concourse.

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10. Ker, Claude B.: Infectious Diseases, London, Henry Frowde, 1920, p. 31.

11. Carballeira, Jose C.: Unusual Occurrence of Recurrent Measles During Convalescence and in the Course of an Attack of Scarlet Fever. J. A. M. A. **77**:377 (July 30) 1921.

12. Goldberger, I. H.: An Early Diagnostic Sign in Measles, Arch. Pediat. **41**:427 (June) 1924.

UNRESOLVED PNEUMONIA IN CHILDREN

TREATMENT WITH ROENTGEN RAY *

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CHICAGO

In a condition so serious as unresolved pneumonia, one is always on the alert for some newer form of treatment that will be of benefit. In the fall of 1923, a baby with an undiagnosed lung condition was examined under the fluoroscope. The mild dose of roentgen ray given to the child was apparently a factor in the resolution of pneumonia which was present. The child had been ill for several weeks and had shown no improvement previous to this examination. Twenty-four hours later signs of resolution had begun and recovery was not long delayed.

In consulting the literature for a period of ten years, it was found that there was only one report of the use of roentgen ray in the treatment of a series of cases of unresolved pneumonia. This covered twelve cases of chronic chest conditions reported by A. J. and W. A. Quimby,[1] in which the roentgen ray was used, three cases of pneumonia with a brief report, three cases of pneumonia with full history, one crushing injury of the lung and four cases in which they do not specify the condition or give case reports. There has been no report confirming that of the Quimbys, though several reports advocate the use of the roentgen ray in certain types of pulmonary tuberculosis.

ETIOLOGY

In the last two years, 1923 and 1924, I have had twelve cases of this condition in babies and children which I have considered unresolved pneumonias. These were treated, with the cooperation of M. T. Blumenthal, roentgenologist of the Northwestern University, by the roentgen ray, with seemingly favorable results in all except one.

Pneumonia in babies and children, whether of a pure lobar type or bronchopneumonia, has a distinct tendency to be prolonged. In lobar pneumonia in the adult, one looks for the crisis about the fifth day, but the baby or child seldom has a crisis before the seventh day. Holt, in his textbook, reports 567 cases of lobar pneumonia in which the temperature fell by crisis. Fifty-seven per cent. had a crisis on the seventh day or after. In only two cases was there a crisis after the eighteenth day. The temperature of babies with lobar pneumonia often drops

* Received for publication, Feb. 3, 1925.

1. Quimby, A. J., and Quimby, W. A.: Roentgenotherapy in Unresolved Pneumonia, New York M. J. **103**:681 (April 8) 1916.

by lysis, and it is exceptional to have fever present at the end of two weeks. I have arbitrarily fixed three weeks of abnormal temperature and persistence of consolidation as constituting a case of unresolved lobar pneumonia.

DURATION OF DISEASE

The course of bronchopneumonia is invariably much longer, partly because it so often occurs in children already debilitated. If the temperature is used as a criterion, the figures from Holt's textbook are enlightening. In seventy-eight patients, 11.5 per cent. were temperature free in less than seven days, 66.6 per cent. in from seven to twenty-one days and 21.9 per cent. in from twenty-one to ninety days. A considerable number are free from fever by the third week. I have therefore arbitrarily chosen four weeks of fever and signs of consolidation as criteria in defining a case of bronchopneumonia as unresolved.

TREATMENT

The question may be asked, why should other than the usual treatment be given to these patients? If something other than the customary treatment with iodids, cod liver oil, careful management of diet and fresh air is not resorted to, the picture is often thus: The temperature, which has been high in the acute stage, becomes lower, but the lungs often show larger and larger areas of consolidation; there is a progressive loss of weight and appetite, and often the patient succumbs after eight or ten weeks' illness. If recovery takes place, there is a slow convalescence and frequent relapses.

In a condition in which the clinical picture is one of wasting, the question always arises, is the process tuberculous? A Pirquet or intradermal tuberculin test should always be made. As is well known, these tests are often negative in pulmonary tuberculosis, so that the progress of the patient would ultimately make our diagnosis. In none of the patients in this report was the Pirquet test positive, nor was the progress later indicative of tuberculosis in any of them.

Hess,[2] in a paper written in September, 1917, illustrates the frequency of tuberculosis in these patients, and also the poor prognosis in all of them. He reported on sixteen of twenty-two patients which he had observed and followed for five years. Of this number only three were in good health, three were in poor health, and eight had died either in the hospital or at home after leaving the hospital. Of those who died, three had had a negative Pirquet test made while in the hospital, but the necropsy showed that the lung process was only a part of a generalized

2. Hess, Julius: Unresolved Pneumonias — What Becomes of Them, Arch. Pediat. **34**:686 (Sept. 17) 1917.

tuberculosis. Of the twenty-two cases, five showed a positive Pirquet test, in two the test was not made and in fifteen it was negative. One of the patients who had a negative test when in hospital later developed a frank case of tuberculosis.

OBJECTIONS AND RESULTS

Are there any serious objections to the use of the roentgen-ray treatment, and what is its probable action? Corper and Chovey,[3] in work on mice, found that after leukocytic destroying doses of roentgen ray there was an increased susceptibility in mice to intraperitoneal injections of pneumococcus and streptococcus, as evidenced by the time elapsing before death and the number of organisms in a given volume of blood cultured, as compared with control animals. They quote Hektoen, whose work proved that leukoplastic doses of roentgen ray destroyed antibodies in the blood.

Russ [4] found that large doses of roentgen ray caused profound changes and reduced immunity by destroying lymphocytes. Large doses, then, would certainly not be logical. Small doses were found to increase immunity in mice by stimulating lymphocytosis. The motility of typhoid and paratyphoid organisms were found by Gutzeit, Brinkmann and Kotschau [5] to be increased by small doses of roentgen ray.

The Quimbys, in their report on the treatment of unresolved pneumonia with the roentgen ray, theorize as follows:

> Where resolution occurs the exudate of fibrin, serum and leucocytes disentegrates and is softened and carried away by lymphocytes. Where resolution fails to occur, organization rather than disintegration occurs. The X-ray with its short and rapid wave length causes breaking up of molecular structure.

They quote Hemecke's work, in which he exposed a rat's entire body to large doses of the roentgen ray with consequent leukocytic destruction beginning in two and a half hours, reaching a maximum in ten to twelve hours, and ceasing after five or six days. If leukocytic destruction occurs, then one of the body defenses would be destroyed and the condition became worse. It would seem more logical to assume that the small doses of roentgen ray penetrating the lung tissue acted as a stimulant to phagocytosis. It would also seem logical to use relatively small doses. The roentgen-ray dosage was not given by the Quimbys in their report. They mention a twenty minute exposure in one case but do not give any other details.

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3. Corper, H. J., and Chovey, P.: Effect of Roentgen Rays on Pneumococcus and Streptococcus Infections in Mice, J. Infect. Dis. **27**:491 (Nov. 20) 1918.

4. Russ, S.: Experimental Studies with Small Does of X-ray, Lancet **1**:692 (April 26) 1919.

5. Gutzeit, K.; Brinkmann, J., and Kotschau, K.: Stimulating Action of Roentgen Rays, München. Med. Wchnschr. **71**:162 (Feb. 8) 1923.

The dose given by Blumenthal was 5 milliamperes, spark gap 7½ inches, distance 8 inches, filter through 3 millimeters of aluminum and 4 of sole leather, the time being five minutes. The exposure was made posteriorly over the area of greatest consolidation, found clinically and by localization by means of roentgenograms. In only two cases was a second treatment given, in one within ten days, and in another within two weeks. We felt that the effect of the first treatment had not ceased up to that time.

For example, Regaud [6] reports that the cells of the dermis show microscopic changes long after the epidermis macroscopically looks normal after desquamating from roentgen-ray exposure.

The present report deals with twelve cases, five of lobar pneumonia, five of bronchopneumonia and two of an apparently combined type.

REPORT OF CASES

CASE 1.—B., a girl, aged 6 weeks, artificially fed, was brought to the hospital Jan. 21, 1923, by her mother, because the baby was weak and she could not get it to take the bottle. She had no suspicion that the child was acutely ill. There was a history of a slight rhinitis three weeks before, but only a day or two of recognized fever (at that time the temperature was not taken). The baby grew progressively weaker, and finally two days before entrance refused to take the bottle. The mother had not observed any cough, difficulty in breathing or cyanosis.

Physical Examination.—Respiration was very shallow, regular but rapid, from 50 to 60 a minute. Over the chest posteriorly there was slight impairment of resonance near the angle of the right scapula, with definite bronchial breathing and a few crepitant râles at the periphery of the area. The baby was fed by gavage for several days and the general condition improved slightly. The lung findings, however, did not improve. The temperature was never over 100.2 F. in the afternoon, rectally. The baby was critically ill at all times. The Pirquet test was negative.

A roentgen-ray treatment was given January 26, five days after entrance to the hospital, and after three weeks' illness. There was no temperature reaction. The next day there was no change in the lung findings. The second day after treatment the breath sounds were less bronchial in type, and there were moist râles over the area. The baby began to take her feedings slowly from the bottle and with a medicine dropper. In a week's time the chest had entirely cleared up clinically, the child was taking her feedings from a bottle easily, and from then on the progress was uneventful. This was a type of asthenic pneumonia in a weak baby, poorly cared for. This baby has visited the dispensary regularly since that time, and is a strong healthy child.

CASE 2.—W., a girl, aged 4 months, was admitted to the hospital May 29, 1923, as a feeding patient with a diarrheal disturbance. There was a history of illness for many weeks, growing much worse with onset of rhinitis and cough three weeks or so before entrance. On entrance there was a slight evening rise of temperature from 100.6 to 101 F. The baby was badly nourished but appeared quite vigorous. It had a short, nonproductive cough at rather frequent intervals. Respirations were slightly accelerated. Both ears showed mild otitis media and the pharynx was slightly swollen and reddened. There was

6. Regaud, C.: Latent Period in Roentgen Ray Treatment, Bull. Acad. of Med. **90**:375 (Nov. 20) 1923.

a definite but small area of consolidation between the angle of the scapula and the spine on the left side, with rather scattered crepitant râles around this area. The Pirquet test was negative. The exact time of onset of the illness was not known, but the baby had been ill for several weeks. A roentgen-ray treatment was given June 1, two days after entrance and probably after at least three weeks' illness. There was no temperature reaction. In three days the temperature was normal, and the lung clinically showed signs of resolution. In a

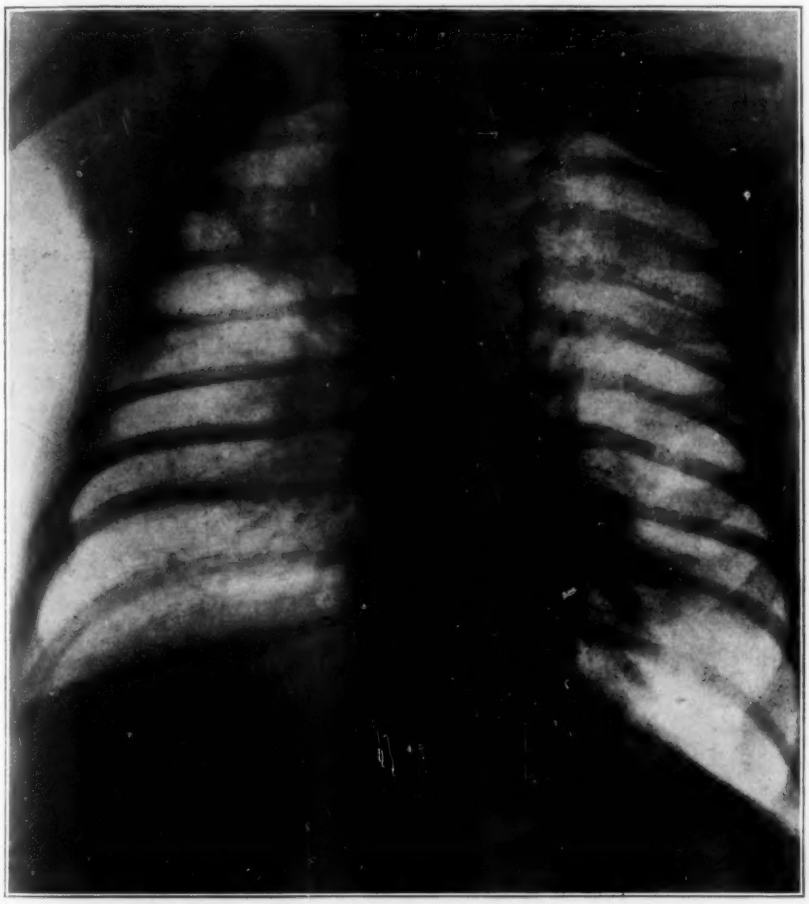

Fig. 1 (Case 1).—Roentgen-ray plate day of treatment.

week's time the chest was normal clinically. This child has been under repeated observation since and is well and strong.

Case 3.—D. C., a boy, aged 7 months, was breast fed. The infant was born prematurely and weighed 3 pounds (1.4 kg.) at birth. He was seen throughout the course of illness at home from the time of onset, Dec. 28, 1923, at which time there was a diagnosis of pharyngitis and otitis media. Both drums required paracentesis. The temperature was 103 F. at onset, 102 the second day, and the third day was 104.4. The respirations were accelerated, but

not labored. On the third day a beginning pneumonia of the right upper lobe was found. The baby remained ill and lost ground steadily for thirty-three days. The temperature remained low during this time, but was never normal in the afternoon. The findings were consolidation without râles.

The child refused to nurse and had lost 3 pounds (1.4 kg.) The tissues had lost their firmness. A roentgen-ray treatment was given Jan. 30, 1924, thirty-

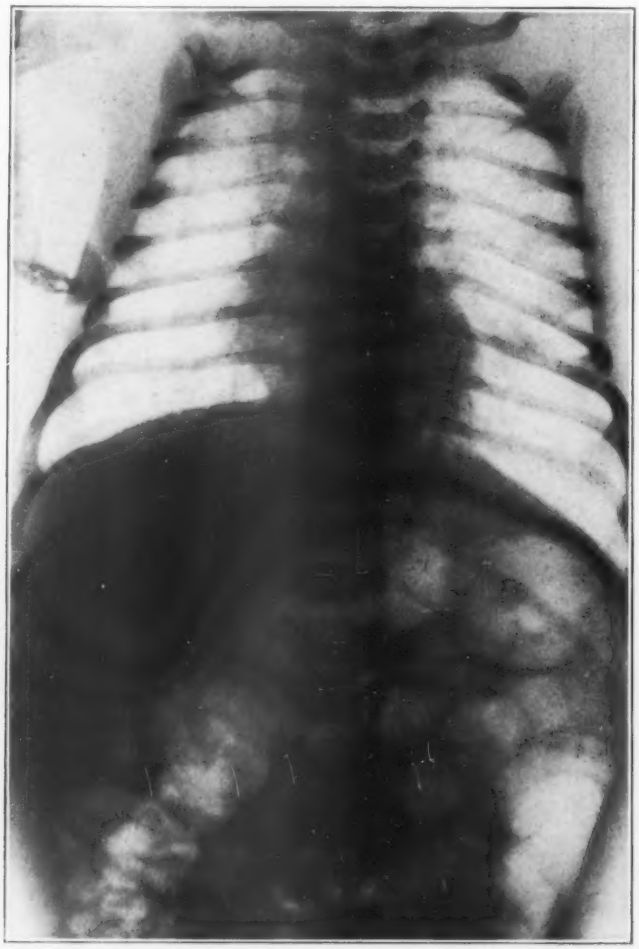

Fig. 2 (Case 1).—One week after treatment, still showing some change though clinically well.

three days from the onset of the illness. That evening the mother reported a rise in temperature to 103 F., and the baby was quite apathetic. The next day the temperature was 102, with the findings in the chest unchanged; the second day the temperature was normal, râles were beginning to appear over the consolidated area, and the cough was more marked. After ten days the lung had completely cleared clinically, but the roentgenogram taken three weeks

later showed a slight consolidation. From that time on the progress was uneventful to full recovery. No Pirquet test was made in this case.

CASE 4.—S., a girl, aged 10 months, was a breast fed baby, and when seen first, at the office, Feb. 4, 1923, the temperature was 103 F. The child had been ill for four weeks, with a history of bronchopneumonia, and had been under the care of the family physician. A diagnosis of empyema had been

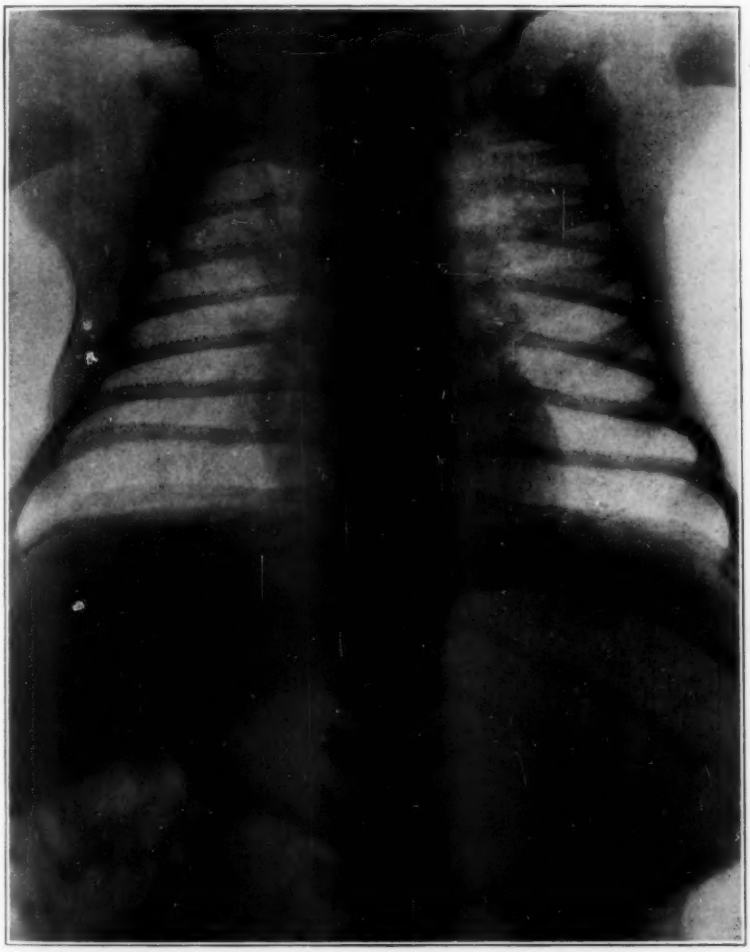

Fig. 3 (Case 1).—Seventeen days after treatment.

made from the flatness of the note over the chest posteriorly. The findings were scattered râles over the left base posteriorly, with signs of consolidation and bronchial breathing which was distant in type, suggestive of a thickened pleura. The note was not sufficiently flat, nor the area involved sufficiently large to warrant paracentesis. A fluoroscopic examination suggested a thickened pleura only. A roentgen-ray treatment was given February 6, in the fifth week of illness, and the patient was not seen again for three days. The

temperature then was 100.4 F. rectal at 1:30 p. m., the scattered râles had disappeared, the area was still dull, but the bronchial breathing had been replaced by bronchovasicular breathing and moist râles were heard, showing that resolution had set in. In two weeks there was no evidence of the previous process, except that the breath sounds were more distant and there was some impairment in resonance. This child has made good progress and has remained well.

Fig. 4 (Case 3).—Roentgen-ray plate at time of treatment.

CASE 5.—A. G., a boy, aged 15 months, was seen April 4, 1925, the third day of illness, and from that time on. Definite lobar pneumonia of the left upper lobe was found. The child remained ill for twenty-eight days; the temperature was high only for about a week, but did not come down to normal. There was progressive loss in strength, weight and appetite. There was little if any change in the extent of the consolidation, and no râles. The child was never distressed from cough or from difficulty in breathing. He was given roentgen-

ray treatment on the twenty-eighth day of the illness, May 2. There was no temperature reaction; two days later there were a few râles and some changes in the breath sounds from bronchial to bronchovesicular. This patient was not seen again for one month, at which time he was again taken ill, with a temperature of 104 F., and the findings revealed lobar pneumonia over the same area, though somewhat smaller than previously. The temperature fell by lysis in six days and resolution occurred normally. This, in my opinion, should be considered a failure in treatment. The lung had never completely resolved, infection was still present and a relapse occurred. While the child had been able to play around on the floor a week after the roentgen-ray treatment and was free from fever, the mother stated that the breathing was always rapid

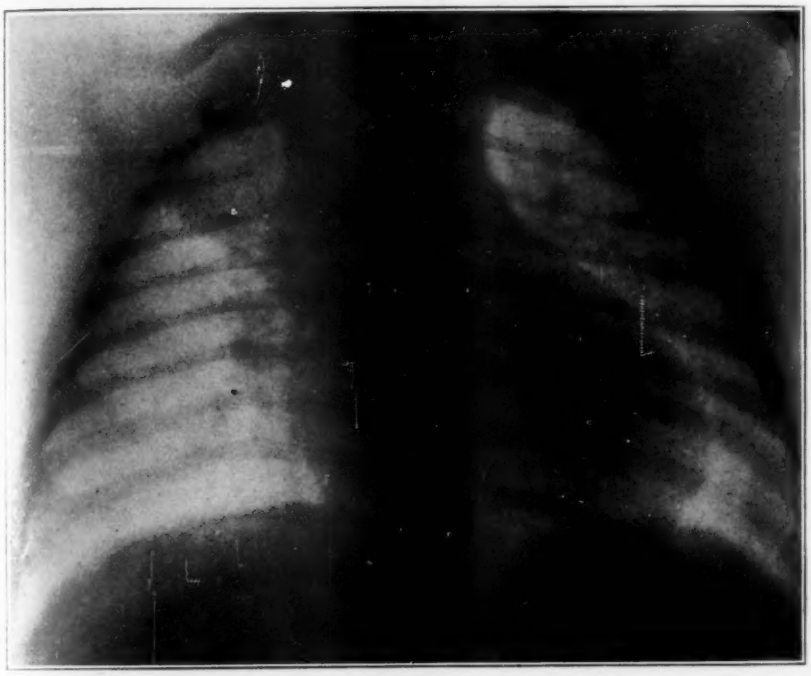

Fig. 5 (Case 3).—Three weeks after treatment.

after slight exertion. Resolution in his relapse was complete clinically in two weeks.

Case 6.—L. G., a boy, aged 16 months, was seen in consultation, Feb. 21, 1924, the third week of disease, and thereafter, as the case was turned over to me. The child was desperately ill with lobar pneumonia in both lungs. There was a double otitis media requiring paracentesis and definite symptoms of encephalitis. He did not recognize his parents, cried out incessantly and obtained no rest. There was a moderate rigidity of neck, sluggish irregular pupils, strabismus, absent patellar reflex on the left side and inability to use the left arm. Spinal puncture gave fluid under pressure with cell count of 150, predominatingly lymphocytes. The child had to be kept under bromid medication and hypodermic injections of morphin to control the almost incessant crying and tossing about. Spinal punctures were made daily for five

days, when the cell count had dropped to 15, and the fluid seemed under little pressure. The child then seemed to be resting more easily and recognized his mother and father. At the end of five weeks of total illness, and two weeks from its onset, all evidence of encephalitis cleared up. The lungs, however, while considerably improved, still showed a large area of involvement over the right lower lobe and to a lesser degree over the upper lobe. This was the fifth

Fig. 6 (Case 6).—Roentgen-ray plate showing condition at first treatment.

week of the disease. The child's temperature was 102, maximum, the cough was troublesome, appetite almost nil, and he had developed multiple abscesses from some of the many hypodermic injections received.

The first roentgen-ray treatment was given March 12, the sixth week of the illness. There was no temperature reaction. Resolution began two days later, but at the end of ten days the upper lobe was still dull on percussion and the child was still running a temperature of 101 to 102 F. The second treatment

was given ten days later, March 22. During the same night the temperature went up to 105, the second day it was 104 and the third day the maximum was 100. In ten days' time, the breath sounds were all clear and percussion normal. In May, two months later, the child was back to his former weight and was quite normal. In September he had lobar pneumonia again, and was free from fever in a week's time and made an uneventful recovery. No Pirquet test was made.

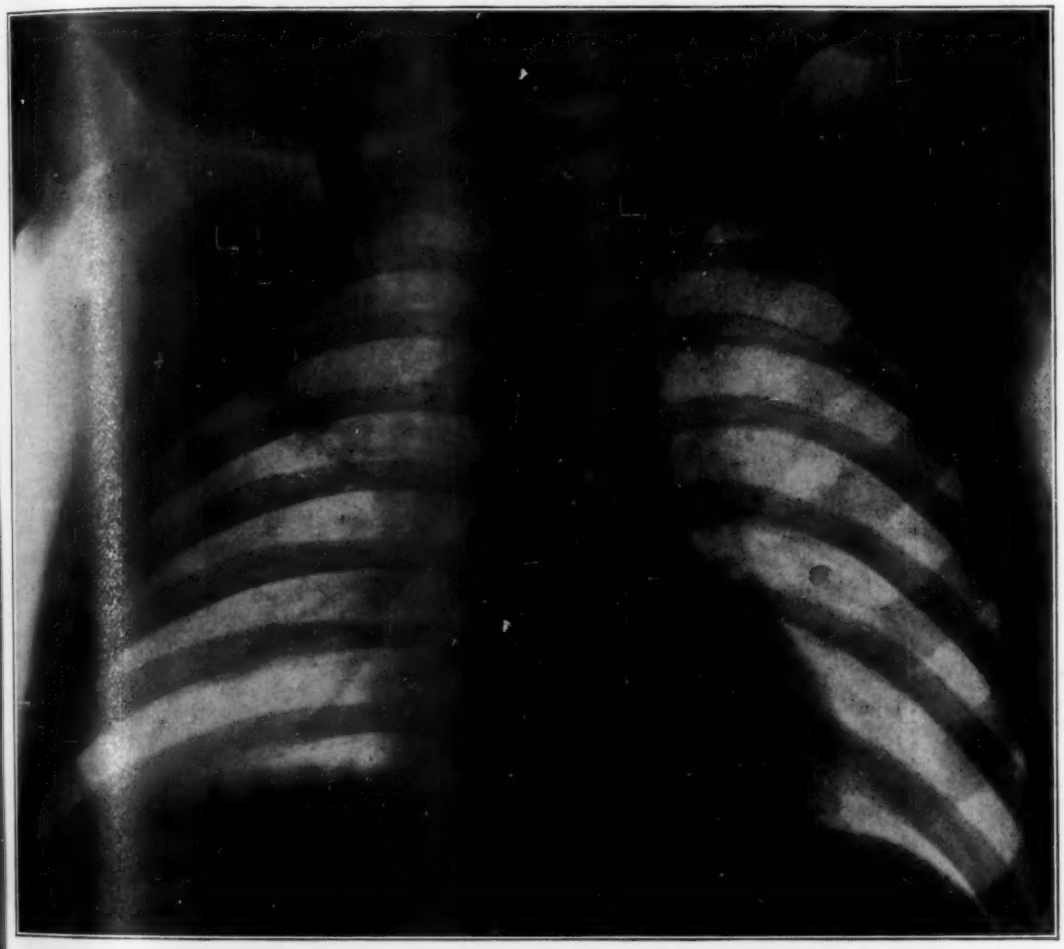

Fig. 7 (Case 6).—Condition at second treatment.

CASE 7.—P., a girl, aged 1½ years. The case was referred to me, and the patient was first seen Feb. 17, 1924, with lobar pneumonia of the left upper lobe. The child had been ill for three weeks; there were no signs of resolution and a progressive loss of strength. The temperature was from 100.6 to 101 F., the child coughed almost incessantly. Roentgen-ray treatment was given February 18, the fourth week of illness. There was no temperature reaction. The physician who followed this case stated that signs of resolution began twenty-

four hours after treatment, and the lungs cleared up in two weeks. This child was again seen two months later with an attack of pyelitis. A roentgenogram was obtained and normal lung findings were shown. The Pirquet test was negative at this time.

Case 8.—T. DeG., a girl, aged 20 months, was first seen March 28, 1923, with lobar pneumonia of right upper lobe. Roentgen-ray treatment was given at the end of the third week of the disease. At this time the child was in good condition but was beginning to lose ground. The temperature, which had fallen by lysis, was now only half a degree in the evening. The baby was treated April 19, after twenty-one days' illness. Râles appeared two days later and resolution was complete in two weeks. This patient has been seen repeatedly since, and so far has been in good health.

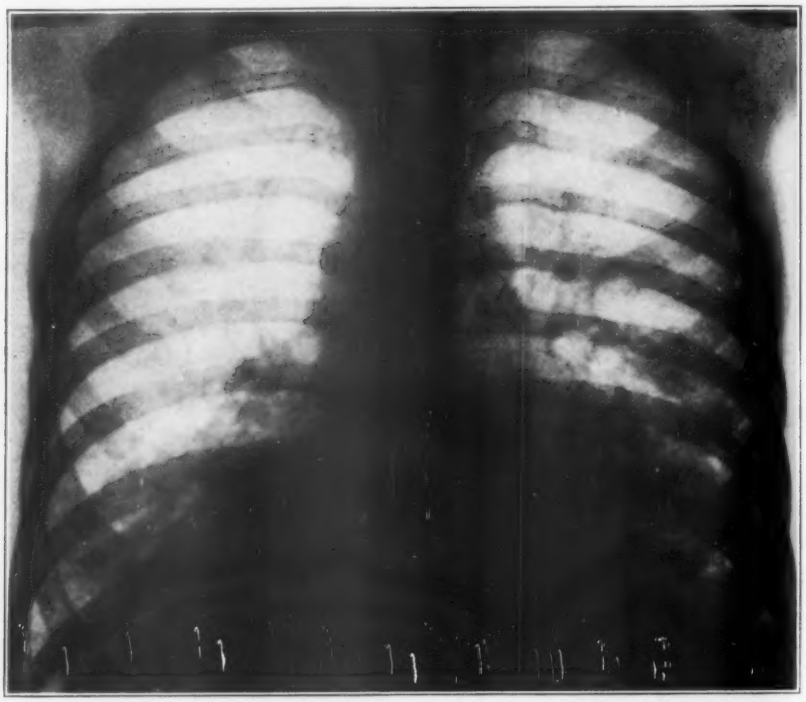

Fig. 8 (Case 10).—Roentgen-ray plate at time of treatment.

Case 9.—A., a girl, aged 2 years, was first seen Feb. 13, 1923, at the office. She had been ill for five weeks with bronchopneumonia. Her temperature was 102 F.; the Pirquet test was negative. There was a double discharging otitis media present. There were scattered râles over both lungs, and several areas of bronchial breathing, the largest over the left lower lobe. Roentgen-ray treatment was given February 15, at the beginning of the sixth week of illness. In two weeks the consolidated area had cleared up; there were still some râles scattered over both sides of the chest. I saw this child one year later, in April, 1924, and her general nutrition was good.

Case 10.—Q., a girl, aged 4 years, was seen in consultation Sept. 2, 1923, the fourth week of bronchopneumonia, complicating whooping cough. The maximum temperature was from 102 to 103 F. The findings were marked over both

lungs, particularly over the right lower lobe. Respirations were very rapid and the cough incessant. Roentgen-ray treatment was given September 5, the fourth week of the illness. In this patient treatment was given over the greatest area of consolidation; it was difficult, because of the many râles present, to determine resolution by this sign. However, the physician in charge of the case stated that percussion was normal over the area treated in three weeks, and both lungs had cleared up at the end of four weeks—eight weeks in all from the onset of the pneumonia.

CASE 11.—M. A., a boy, aged 5 years, had been ill for four weeks when seen on April 8, 1923. The patient had a severe paroxysmal cough. The condition had been diagnosed as whooping cough, and the child had been given whooping

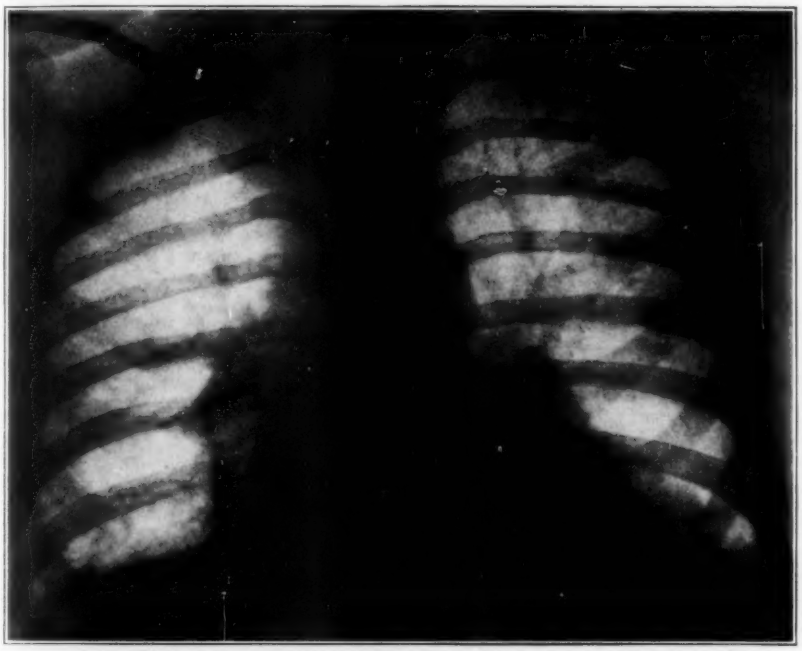

Fig. 9 (Case 10).—Four weeks after treatment. Still showing slight area of unresolved lung, though clinically well.

cough vaccine. The temperature ranged from 101 to 102 F. by mouth. There was no great amount of prostration, but complete loss of appetite and great loss in weight. The cough was suggestive of tuberculous bronchial glands with pressure. Over the right lower lobe there was an area of consolidation with distant bronchial breathing, with many crepitant râles around the periphery of this area.

Roentgen-ray treatment was given the fifth week of the illness, April 10, 1923. There was a marked rise in temperature the same evening, 104.4 F., by mouth, and the patient was prostrated. The next day the temperature was 104, and two days later there was a maximum temperature of 100. Resolution was complete in ten days. This child has been seen repeatedly, roentgen-ray plates of the lungs have been taken, and two Pirquet tests have been made, because the child has been persistently under weight, all with negative results. He

looks well, but the parental management of diet is poor, which probably accounts for his failure in gaining more rapidly.

CASE 12.—A. F., a boy, aged 10 years. The child developed pleuropneumonia following measles, involving particularly the left lower lobe. He was first seen May 30, 1923, in consultation, fourth week of the disease and looked badly nourished. The temperature was 101 F.

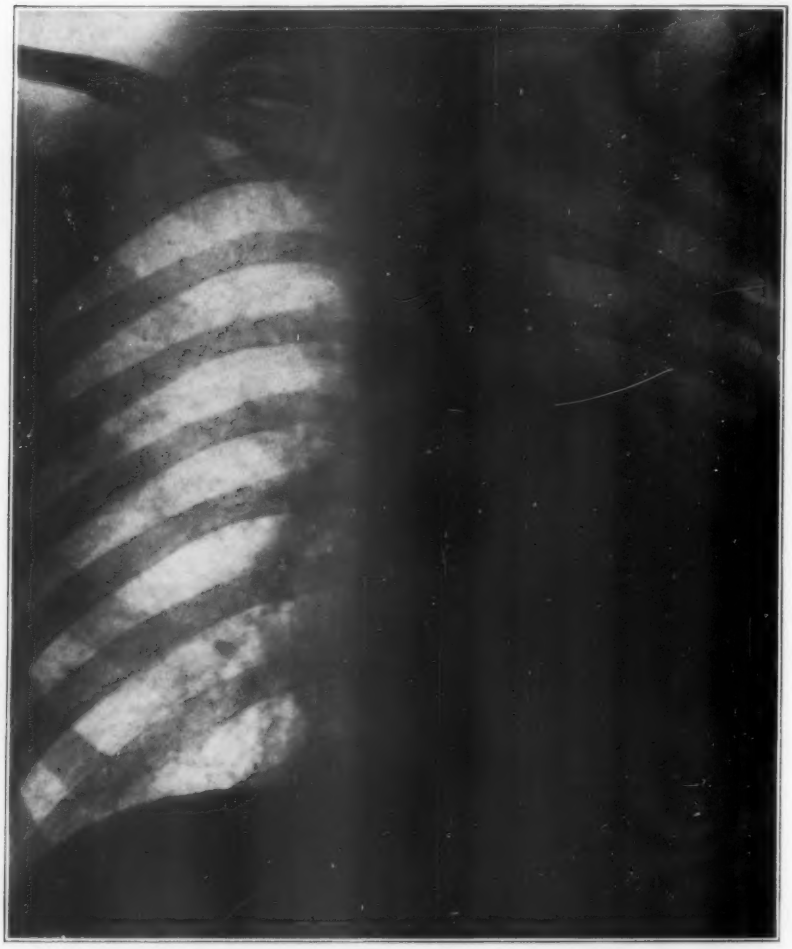

Fig. 10 (Case 12).—Condition at time of treatment.

He was given roentgen-ray treatment May 31. There was no temperature reaction. The physician in charge saw him for the first two days after treatment. Resolution began the second day. There was a lapse of four or five days in his visits, and when he next returned he found that, contrary to his orders of rest in bed, the patient was playing out of doors. The lungs still showed some râles and some evidence of pleural thickening, distant breathing and impaired resonance. Progress was uneventful, and the child is now in good health.

CONCLUSIONS

1. In twelve cases of unresolved pneumonia treated by roentgen ray there was apparent benefit in eleven.

2. There seemingly was fever and constitutional reaction in three cases. This was temporary and probably beneficial.

3. There is no evidence of any harm in the use of the roentgen ray in the dosage given.

30 North Michigan Avenue.

THE ANTIRACHITIC ACTION OF COD LIVER OIL

COMPARISON OF FRESH OIL WITH CONCENTRATE PREPARED FROM OIL *

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NEW YORK

In a previous publication,[1] the preparation, from cod liver oil, of a concentrate possessing the same antirachitic and antiophthalmic activity as the oil from which it was made was described. Extended observation over a long period of time has proved definitely that this cod liver oil concentrate is as effective in children as in animals.[2]

The present publication reports the results of experiments initiated for the purpose of establishing a quantitative relationship between the cod liver oil concentrate and the fresh oil. At the same time, I planned to determine the minimal quantity of cod liver oil which would protect rats against rickets when fed on a given rickets-producing diet.

Accordingly, young rats were placed on the Pappenheimer-Zucker Diet D [3] for a period of thirty days. During this time, one group of rats received daily doses of varying quantities of fresh cod liver oil. Another group was given an equivalent amount of cod liver oil in the form of a concentrate prepared from the oil. A third group acted as controls.

At the end of the experimental period, the animals were roentgenographed. The control animals showed rickets, while all those receiving either cod liver oil or the cod liver oil concentrate remained free from rickets.

From a study of the table and the roentgenograms, it is evident that the concentrate is as effective, gram for gram, as the fresh oil from which it was made. This corroborates the findings of Steenbock, Jones and Hart.[4]

It should be noted further that on the Pappenheimer-Zucker Diet D, 7 mg. of fresh cod liver oil—or its equavalent in the form of the concentrate—is close to the minimal antirachitic dose. Naturally enough,

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* Received for publication, April 21, 1925.

* From the Biochemical Department of the H. A. Metz Research Laboratories.

* Presented at the Ithaca meeting of the American Chemical Society, Sept. 8-13, 1924.

1. Dubin, Harry E., and Funk, Casimir: J. Metabol. Res. **4**:467, 1923.

2. Fischer, Louis: J. Metabol. Res. **4**:481, 1923.

3. This diet consists of patent flour, 80.9 gm.; egg albumin 10.0 gm.; butter fat, 5.0 gm., and salts, 4.1 gm.

4. Steenbock, H.; Jones, J. H., and Hart, E. B.: J. Biol. Chem. **58**:383 (Dec.) 1923.

the minimal dose would vary both with the potency of the oil and with the type of diet used. Thus, Goldblatt and Zilva,[5] using the McCollum Diet 3143, found that the minimal protective dose against rickets was 3.3 mg. of cod liver oil per day.

Obviously, it is possible that the same sample of oil might show different degrees of potency, depending on the diet. Hence, any statement as to the potency of a particular sample of oil must be considered in the light of the experimental procedure. One cannot arbitrarily talk of the minimum growth-promoting or the minimum antirachitic dose of cod liver oil.

At this point, it may not be amiss to consider the nutritional value of the so-called "minimal growth-promoting dose" of cod liver oil as against the quantity of oil necessary for complete nutrition.

Comparison of Antirachitic Effect of Fresh Cod Liver Oil and of Cod Liver Oil Concentrate

Rat	June 26	July 24	Gain	Roentgen Ray	Substance Tested
694	49	89	40	Slight rickets	7 mg. cod liver oil daily
695	42	53	11	Normal	14 mg. cod liver oil daily
696	45	65	20	Normal	21 mg. cod liver oil daily
697	31	37	6	Normal	28 mg. cod liver oil daily
702	51	74	23	Slight rickets	.01225 mg. concentrate = 7 mg. oil
703	43	57	14	Normal	.02450 mg. concentrate = 14 mg. oil
704	43	61	18	Normal	.03675 mg. concentrate = 21 mg. oil
705	56	91	35	Normal	.04900 mg. concentrate = 28 mg. oil
714	50	72	22	Rickets	Control
715	33	45	12	Rickets	Control

Assuming that every other component of a given diet is present in adequate amounts and proportions, excepting only the antirachitic and antiophthalmic vitamins, a rat will grow as long as its body reserve of the antiophthalmic vitamin A holds out. When growth ceases, the "minimal growth-promoting dose" of cod liver oil, which may be as little as 0.001 gm., if given daily, will cause the animal to resume growth.

The animal may continue to grow for a month or two, but there is no evidence to show that normal growth and reproduction will ensue. This could hardly be expected, since 0.001 gm. oil does not supply the antirachitic requirements.

On the other hand, if sufficient cod liver oil be given to supply the required amount of antirachitic vitamin, the antiophthalmic or vitamin A requirements will perforce be taken care of, and normal growth and reproduction are bound to follow.

Consequently, in applying the results of animal experiments to human nutrition, it is preferable to have an excess of vitamins present in the diet so that the requirements for reproduction, as well as for growth, will be amply provided for.

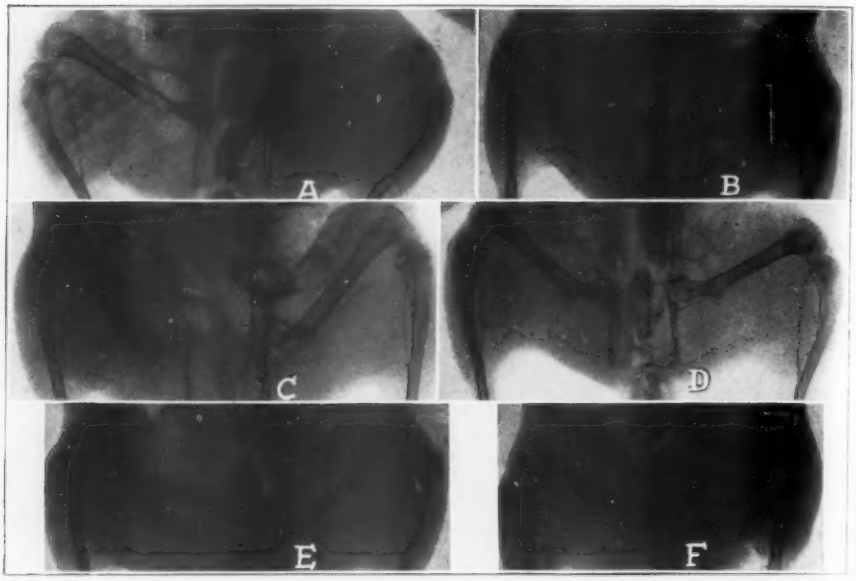
5. Goldblatt, H., and Zilva, S. S.: Lancet **2**:647 (Sept. 29) 1923.

As regards the fat-soluble vitamins, the cod liver oil concentrate described offers a means of increasing the vitamin supply without unduly increasing the amount of fat to be metabolized.

SUMMARY

Rats kept on the Pappenheimer-Zucker rickets-producing Diet D could be protected against rickets by the daily administration of 0.014 gm. of cod liver oil.

On a daily dose of 0.007 gm. of cod liver oil, slight rickets developed.



A, Rat 694: slight rickets; cod liver oil (0.007 gm. daily). *B*, Rat 695: normal; cod liver oil (0.014 gm. daily). *C*, Rat 702: slight rickets; cod liver oil concentrate (0.0000123 gm., equivalent to 0.007 gm. cod liver oil daily). *D*, Rat 703: normal; cod liver oil concentrate (0.0000245 gm., equivalent to 0.014 gm. cod liver oil daily). *E*, Rat 714: rickets; control. *F*, Rat 715: rickets; control.

The same results were obtained with equivalent amounts of cod liver oil in the form of the vitamin containing concentrate prepared from the oil.

CONCLUSION

From the foregoing, it is evident that the concentrate—the ether-soluble, nonsaponifiable fraction—of cod liver oil is just as potent an antirachitic agent as the oil from which it is made, gram for gram.

In order that the requirements for reproduction, as well as for growth, may be provided for, the diet should be so arranged that an excess of vitamins is present.

The nonsaponifiable fraction of cod liver oil is admirably suited for this purpose, since it furnishes the necessary fat-soluble vitamins without disarranging the balance between fats, proteins and carbohydrates.

ECTOPIA CORDIS

REPORT OF A CASE *

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AND
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In his description of congenital conditions of the heart, Osler [1] mentions and defines ectopia cordis as a condition associated with fission of the chest wall and of the abdomen, in which the heart is displaced so that it passes out of the thorax and lies either on the outer surface of the body or in the abdominal cavity. He cites Ellis [2] as following Ranchfuss, who divides the cases into: (*a*) pectoral heart, with fissure of the sternum; (*b*) abdominal heart, in which the organ protrudes into the abdomen through a defect in the diaphragm with or without external tumor, and (*c*) cervical heart.

Pfaundler and Schlossman [3] state that ectopia of the heart is more of anatomic than of clinical importance. With ectopia the sternum is wholly or partially absent and the skin may be normal or may also be lacking. Ectopia may be an isolated arrest of development or may be but part of an eventration, in which the greater portion of the anterior chest and the abdominal wall is absent, so that the viscera of the thorax and abdomen lies outside the body. Both ectopia, in which the heart may be covered by pericardium or be completely uncovered, and eventration make it impossible for the child to live.

REVIEW OF THE LITERATURE

The subject is discussed concisely in Allbutt's [4] "System of Medicine," also by Abbott [5] in Osler and McCrae's "System of Medicine."

Most of the literature concerning ectopia cordis is in the form of case reports. In 1906, Ellis [2] published a paper entitled congenital malformations of the heart. He described a case of pectoral heart, in which the organ was covered by visceral pericardium only. In this

* Received for publication, April 17, 1925.

* From the Surgical and Pathological Services of the Children's Hospital.

1. Osler: Practice of Medicine, New York, D. Appleton & Co., 1907, p. 843; ibid., Modern Medicine, Philadelphia, Lea & Febiger, **4**:343, 1908.

2. Ellis: Proc. Path. Soc., Philadelphia, **18**:36, 1906.

3. Pfaundler and Schlossman, Eng. Translation by Shaw and LaFetra, Philadelphia, J. P. Lippincott Co., **3**:496, 1912.

4. Allbutt's System of Medicine: New York, The Macmillan Co., **6.**

5. Abbott, Maud: Osler and McCrae's System of Medicine, Philadelphia, Lea & Febiger, Ed. 2, **4**:346.

case the lateral halves of the sternum were united except for a distance of 2 cm. at the lower extremity. The gap between the parts was 5 cm. The infant, a boy, lived for twenty-three and one-half hours. Ellis referred to Peacock,[6] who cited thirteen cases of various types reported by others and described another specimen in the Museum of St. Thomas' Hospital.

Ellis also referred to Ballantyne,[7] who mentioned nine additional cases and stated that others had been reported. Nine cases of the sterno-epigastric type collected by Taruffi,[8] in which the entire sternum and the abdominal wall to the umbilicus were divided, he regarded as more properly belonging under the classification of gastroschisis.

Ellis quoted a case reported by Lannelogue, in which a thin membrane covering the heart sloughed on the fifteenth day and the outer skin covering the organ was successfully united by sutures. He suggested that such operative interference might be tried in suitable cases where the visceral pericardium is present.

In the case reported by Goode,[9] the patient was a girl, with fissure of the sternum below the manubrium and with visceral pericardium present. The heart was oiled every three hours and was kept covered with a cardboard box. The child did very well for a time but died on the sixteenth day.

The most recent report of a case of ectopia cordis was published in 1924 by Cosgrove and St. George,[10] in which, after describing the case of a stillborn infant, they commented on the condition. They referred to the case Holmes [11] reported from Howland's Clinic of an infant who lived for fifteen months. After four weeks with constant dressing the organ became covered with skin. They stated that cases have been observed in this country by Holt,[12] Jacobi and Welch and referred to Ellis'[2] article.

Cosgrove and St. George also referred to the observations of Schwalbe,[13] who stated that anomalies in the development of the sternum, particularly in the lower animals, are by no means rare and thus anomalous positions of the heart even within the thorax are frequently produced.

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6. Peacock: Malformations of the Heart, 1886.
7. Ballantyne: Manual of Antenatal Pathology and Hygiene, The Embryo, New York, William Wood & Co., 1904.
8. Taruffi: Storia della Teratologia, **8**:410,1894.
9. Goode: Virginia M. Semi-Monthly, 555, 1914.
10. Cosgrove, S. A., and St. George, A. U.: Report of a Case of Ectopia Cordis, Am. J. Dis. Child. **27**:594 (June) 1924.
11. Holmes, J. B.: Bull. Johns Hopkins Hosp. **18**, 1917.
12. Holt: Med. News **71**:769.
13. Schwalbe: Morphologie der Missbildung des Menschen, Jena, Gustav Fischer, 1909, p. 44.

REPORT OF CASE

A boy, aged 39 hours, brought to the Children's Hospital, Oct. 18, 1924, was born at full term after a normal but prolonged primiparous labor. The birth weight was 9½ pounds (4.3 kg.).

On examination of the baby immediately after birth, a dark red, pulsating tumor protruding from the upper left side of the thorax was noticed; also there was a large bulging area just to the right of the median line in the region usually occupied by the costal margin. The baby's color was good except when he cried, then cyanosis was perceptible. The condition was diagnosed as congenital anomaly with lack of fusion of the thorax in the middle line and probable defect in the diaphragm anteriorly with diaphragmatic hernia. The

Fig. 1.—General appearance of the pectoral ectopic heart and the bulging displaced liver.

pulsating organ outside the chest was recognized as the heart. A sterile gauze dressing soaked with physiologic sodium chlorid solution was applied around the heart.

During the next twenty-four hours the baby took water by mouth, meconium was passed and urine was voided normally. Soon after birth, he began to have spells of cyanosis which strongly suggested congenital heart lesions. The mass on the right side increased in size and dark discoloration was noticed through the skin covering it.

The seriousness of the case was explained to the father, who wished to have every effort made to determine the nature of the condition, and, if possible, to help the baby by operation.

A roentgen ray examination was made of the thorax, showing the complete absence of bony structures in the anterior median line. A second examination was made after a small amount of barium had been introduced into the stomach. From this it was determined that the diaphragm was intact, but because of lack of firm attachment anteriorly the liver bulged upward and outward through the defect in the bony thorax.

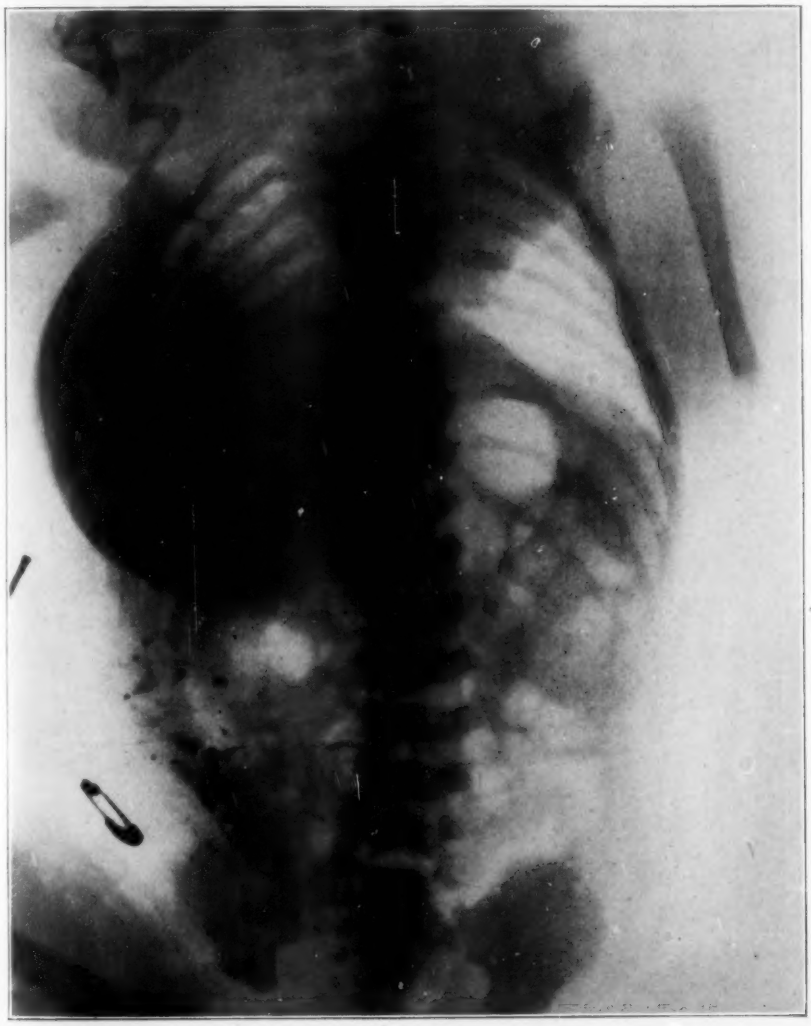

Fig. 2.—The complete absence of sternum, widely separated ribs and proximal ends of clavicles, also the shadows of the ectopic heart and displaced liver.

Except for the obviously abnormal conditions found in the thoracic region, the physical examination was negative.

The distance between nipples was 12 cm.; the pericardial sac of the heart was absent, at least the parietal portion; the auricles were distinguishable; the

diameter of the defect or ring was 3.5 cm.; the height or length of heart was 4.5 cm.; the width or greatest diameter was 4.5 cm.

The displaced liver had an elevation of 4.5 cm.; the linear diameter was 6.5 cm., and the lateral was 8 cm.

Fig. 3.—Roentgenogram after giving a small amount of barium, showing the relation of the stomach and the diaphragm. The barium shadow may be seen as a bolus in the stomach which is below the diaphragm. The shadows scattered over the right side of the abdomen are due to the bismuth subgallate cord dressing.

The baby was taken to the operating room, ether administered and the following operation performed:

An oblique incision about 3 inches (7.6 cm.) in length was made, extending downward from the ring through which the heart protruded out over the ends

of the ribs on the left side. Dissection was continued deeper, the pleura on the left side was exposed and the edge of the left lung was clearly seen through it. The greatest difficulty in making space for the heart was experienced on account of the bulging of the liver on the right side, encroaching on the median line. When the ring had been completely freed exposing the great vessels, it was possible to put the heart under skin flaps and nearly close the defect. However, when this had been accomplished, it was found that the heart was apparently throttled by the pressure of the flaps and respiration and cardiac action had practically ceased. Because of this, and recognizing the futility of correcting the condition by operation, most of the stitches were released and a few minims of epinephrin were introduced into the ventricle, following which the baby revived.

The patient was sent back to the ward in poor condition, and lived for about eleven hours after operation.

Necropsy Report.—The body was that of a fairly well developed and nourished white boy, measuring 48 cm. in length. The neck was short, thick, and bulging without the presence of a palpable mass. The upper left anterior thorax presented an irregular, equitriangular defect or gap which involved the absence of skin and bony chest wall. From the center of this aperture, a small pyramidal shaped heart projected forward. The apex was above the level of the body surface. The edge of the opening was smooth, round, and suddenly dipped posteriorly where a slight fibrino-purulent exudate covered a congested and edematous bed. The heart was held in position by its great vessels which were long, thus permitting considerable motion. The vessels at the base were covered with a thin film of fibrino-purulent exudate. The membranous bed was intact and joined the skin at the periphery of the defect. On the right side a large dome-shaped mass pushed forward and stretched the skin. This mass was semispherical in shape, moderately firm, and measured 5 cm. in height and 8.5 cm. across the base. The skin at the top of the dome was taut, shiny and yellow-green.

The anteroparietal bony chest wall and sternum were absent. The diaphragm was intact, and attached anteriorly to the skin. The right lobe of the liver was encroaching on the lower right thorax, having pushed the diaphragm before it and was firmly adherent to it by fibrous adhesions. In reaching this position, the liver pulled adjacent structures after it.

The pericardium was absent. The heart weighed 16 gm. The length from base to apex was 4.5 cm., while the transverse was 3.5 cm. It was 2.0 cm. in thickness. The external surface was covered with fibrino-purulent exudate. The azygos major and superior vena cava had separate openings into the right auricle. There was no inferior vena cava. There was a persistent duct of Cuvier. The foramen ovale and ductus arteriosus were patent. The aortic isthmus was markedly stenosed. Greater activity on the part of the right ventricle was indicated by hypertrophy.

The lungs showed congestion. There was fibrosis of spleen and liver with fatty degeneration of the latter. Levaditi preparations revealed no syphilis. The skin over the liver was atrophic.

SUMMARY

1. A case of ectopia cordis with photograph, roentgen-ray examination of thorax and operation is reported.

2. In addition to the ectopia, anomalies of circulation were present; namely, patent foramen ovale, patent ductus arteriosus and stenosis of the aortic isthmus.

3. An unsuccessful attempt was made to cover the heart with skin flaps.

CONGENITAL TRANSDUODENAL BANDS *

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Observation of three children dying with uncontrollable vomiting, suggestive clinically of incomplete obstruction, has shown the importance of the only necropsy finding which seemed to be pertinent, namely, the presence of partial obstruction due to transduodenal bands. Certain blood chemical findings have supported this supposition.

The duodenum has been estimated to be the seat of 30 per cent. of all cases of congenital obstructions from the pylorus to the anus.[1] At necropsy, it is not at all rare to find congenital bands attached to various portions of the intestines which probably played no part in the disease causing death. The lower intestine is more commonly the seat of peritoneal bands. Harvey [2] found twenty instances in 105 necropsies on infants.

TYPES OF DUODENAL OBSTRUCTION

Congenital obstruction of the duodenum occurs as a development malformation, usually with a complete atresia or absence of one portion, and rarely as a stenosis. Atresia gives early evidence of existence, while stenosis is less active in its manifestations.

Duodenal obstruction causing recurrent vomiting in children may be caused by kinking, pressure of adjacent arteries, visceral ptosis, redundancies of the cecum, traction on the mesentery, tumors or enlarged glands and numerous other factors. Description of cases from the literature are omitted for the sake of brevity.

Harris [3] reported compression of the duodenum in five adults by "transduodenal" bands of peritoneum, stretching from the under surface of the liver near the gallbladder to the transverse mesocolon. In his case the most common symptom was pain in the right hypochondrium, not all the patients having attacks of vomiting. Homans [4] reported a series of eleven adults from the Peter Bent Brigham Hospital, with

* Received for publication, May 14, 1925.
* Read before the American Pediatric Society, Washington, D. C., May 4, 1925.
* From the School of Medicine, Kansas State University.

1. Davis, D. L., and Poynter, C. W. M.: Surg., Gynec. & Obst. **34**:35 (Jan.) 1922. A similar conclusion as to the incidence of duodenal obstruction is reached by Pehu and Auberge, who quote not only Davis and Poynter, but Schlegel, Kreuter, Fondler, Karpa, Meusberger and von Koos.

2. Harvey, S. C.: Ann. Surg. **67**:641 (June) 1918.

3. Harris, M. L.: Constrictions of the Duodenum, J. A. M. A. **62**:1211 (April 18) 1914.

4. Homans, J.: Boston M. & S. J. **175**:665 (Nov. 9) 1916.

vomiting present in about half of them and epigastric pain in all. Operation resulted in a cure of from eight to eleven patients.

CASE REPORTS

CASE 1.—P. A. G., a girl, aged 5 years, had never had cyclic or idiopathic vomiting. Without food indiscretion or infection, she began to have violent attacks of vomiting; there was no rise of temperature at any time; the stools were of the starvation type and contained no blood. On the thirteenth day of continuous vomiting, she was brought to St. Luke's Hospital. On admission, nutrition was fair, the sensorium was clear, the eyes were not sunken, there was no odor to the breath and no hyperpnea was present. The urine had been about 1 pint daily, containing albumin, but no sugar. On examination, the abdomen was found somewhat below the level, with no tenderness, distension, tumor nor peristaltic wave present. The child vomited once hourly. No evidence of intracranial, thoracic or abdominal disease, other than continued vomiting, was apparent.

The laboratory findings were:

Urinalysis: reaction, acid; specific gravity, 1.018; the albumin was abundant; sugar, 0.8 per cent. and no indican present. The acetone was strongly positive (Rothera and Scott-Wilson); diacetic acid: the ferric chlorid reaction was strongly positive, the chlorids were absent. Microscopically, there were many cellular casts and renal epithelial cells; no pus or blood were seen.

Chemical Examination of the Blood: Urea nitrogen, 14.01 mg. per hundred cubic centimeters; nonprotein nitrogen, 41.6 mg. per hundred cubic centimeters; uric acid, 3.3 mg. per hundred cubic centimeters; creatinin, 2.3 mg. per hundred cubic centimeters; chlorids (as sodium chlorid) 230.0 mg. per hundred cubic centimeters; carbon dioxid combining power, 92.5 per cent. by volume.

Microscopic Examination: Hemoglobin, 65 per cent.; red blood cells, 5,420,000; white blood cells, 23,800; polymorphonuclears, 84 per cent.; large lymphocytes, 4 per cent.; small lymphocytes, 12 per cent.

A diagnosis of incomplete intestinal obstruction was made. Within a few hours of admission to the hospital, the child developed a convulsion, no operation was attempted and death occurred.

Necropsy.—Main gross findings: The stomach was dilated and there was partial high intestinal obstruction due to adhesive bands at the juncture of the duodenum with the pylorus, and also at the duodenal-jejunal juncture; adhesions between the duodenum and the gallbladder beginning at the cystic duct were present. The duodenum in the second and third portion was unusually dilated, measuring from 4 to 5 cm. in diameter, below which the intestinal tract was small and collapsed, with an increased abrupt kink at the beginning of the jejunum causing an evidence of partial obstruction. There was no acute inflammatory reaction in the intestines.

Histologic Pathology: Fatty degeneration of the liver; acute toxic nephritis; early diffuse pneumonia; acute lymphadenitis (mesenteric); acute pancreatitis, hepatitis and myocarditis.

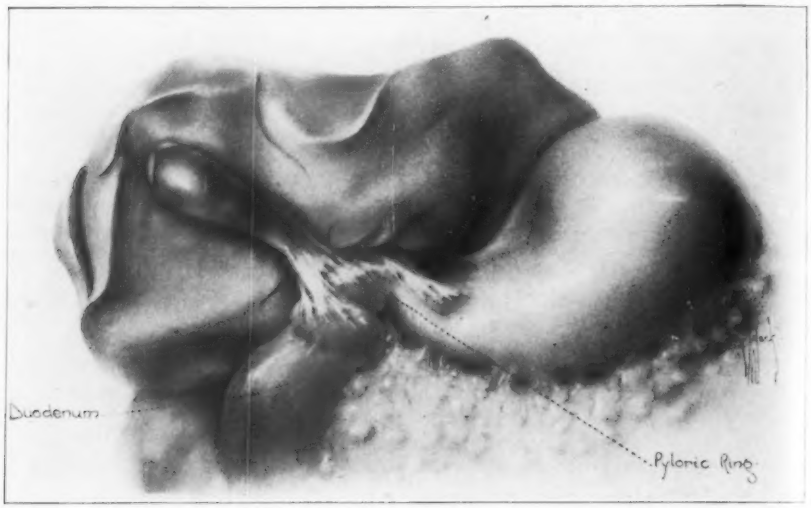
CASE 2.—J. M. M., a boy, aged 12 months, who had been previously well, suddenly became sick with continuous vomiting and the temperature rose to 101 F. Convulsions occurred on the second day of illness, the vomitus became bile stained, the stools grew smaller each day and finally became mucous in character, the abdomen became more or less distended, though no rigidity of the abdominal muscles nor any visible peristalsis were present. Prior to admission to the hospital, the urine showed no albumin and only a few pus cells, the clinical picture was one of pernicious vomiting and not of diarrhea, with a tentative diagnosis of incomplete intestinal obstruction. There had never been any blood in the stools.

On the sixth day of illness the child was brought to Kansas University Hospital. He was desperately sick, vomiting frequently, the abdominal muscles were not rigid, no abdominal tumor could be felt; marked distension rapidly developed; the temperature rose to 104 F., the sensorium was clear, there were no signs of meningitis, the stools were small, mucoid and free of blood.

Laboratory Findings: The urine was negative except for diacetic acid and acetone (Rothera and Scott-Wilson). Chemical examination of the blood disclosed urea nitrogen, 13.3 mg. per hundred cubic centimeters; nonprotein nitrogen, 32.3 mg. per hundred cubic centimeters; chlorids (sodium chlorid), 360.0 mg. per hundred cubic centimeters; sugar, 43.0 mg. per hundred cubic centimeters; carbon dioxid combining power, 57.9 per cent. by volume.

Microscopic Examination: Hemoglobin, 80 per cent.; red blood cells, 4,200,000; white blood cells, 12,500; polymorphonuclears, 62 per cent.; small lymphocytes, 28 per cent.; large lymphocytes, 4 per cent.; large mononuclears, 4 per cent.; transitionals, 2 per cent.

The condition of the child rapidly became worse so that preparations for operation were abandoned. The patient died in convulsions within fifteen hours of admission to the hosital.



Transduodenal cystic bands (from a drawing made at necropsy).

Necropsy.—Main gross findings showed a dilated stomach; there was a band of fetal adhesions extending from the duodenum to the gallbladder, well covering the duodenum; a kink in the pyloric end of the stomach caused a low grade obstruction; when the edge of the liver was raised, it easily caused traction on this cystoduodenal ligament making a sharp kink in the first portion of the duodenum. Filling the stomach with water accentuated the kinking. The intestines otherwise were normal throughout.

Histologic Pathology: Marked fatty degeneration of the liver; generalized mesenteric adenopathy; toxic nephrosis; chronic interstitial pneumonitis; thymic inflammatory reaction; degeneration of the spleen follicles.

CASE 3.—Several years ago, we saw a child, aged 2 years, whose condition was clinically similar to these just reported. The child died after an illness of one week.

COMMENT

Transduodenal bands are remains from fetal life, coming from the primary anterior mesentery of the small intestine. They are persistent after the rotation of the stomach and duodenum in fetal life. They pass

from the gallbladder and under surface of the liver across the duodenum to the region of the hepatic flexure of the colon.

Interference with the lumen and function of the duodenum experimentally in dogs and clinically in human beings gives rise to profound disturbances. Anatomic stasis in the duodenum causes the clinical symptoms of bile-stained vomiting, dehydration, tetany, shock, chemical changes in the blood, acute renal degeneration and nephritis (Brown [5] and his co-workers).

Important blood chemical findings in Case 1 are the extremely low chlorid content and the high carbon dioxid combining power. These findings at once suggested that the child was suffering from an obstruction of the upper intestinal tract. Haden and Orr [6] have shown that the fundamental change in such obstructions is a fall in the chlorid content of the blood, usually with a coincident alkalosis. Such changes are usually apparent before there is an increase in the nonprotein nitrogen of the blood, which is usually considered the most characteristic blood finding. The fall in chlorid seemingly represents a protective mechanism, since toxemia can be uniformly prevented in dogs with high intestinal obstruction if the chlorids are kept at or near the normal level.[7] Similarly, the therapeutic use of chlorids has been found of the greatest value both in experimental animals and in patients [8] even after the toxemia is well developed. It seems most probable that the children we report would have responded to sodium chlorid therapy if attempted in time.

That the chemical finding of the low chlorid level is due to obstruction and not to the vomiting was proved by Haden and Orr [9] in a nonvomiting patient with obstruction, in dogs before the vomiting began, in the rabbit, an animal that never vomits, and also in the monkey in the absence of vomiting.

Until quite recently the presence of acetone bodies in the urine has always been taken as indicative of an acidosis of the ketosis type. In both of these cases we have a high carbon dioxid combining power with a urine containing acetone. Davies, Haldane and Kennaway [10] and others,[11] however, have shown experimentally that acetonuria may occur

5. Brown, G. E.; Eusterman, G. B.; Hartman, H. R., and Rountree, L. G.: Toxic Nephritis in Pyloric Duodenal Obstruction, Arch. Int. Med. **32**:425 (Sept.) 1923.

6. Haden, R. L., and Orr, T. G.: J. Exper. Med. **37**:365 (March) 1923.

7. Haden, R. L., and Orr, T. G.: J. Exper. Med. **38**:55 (July) 1923.

8. Haden, R. L., and Orr, T. G.: Use of Sodium Chlorid in Treatment of Intestinal Obstruction, J. A. M. A. **82**:1515 (May 10) 1924.

9. Haden, R. L., and Orr, T. G.: J. Exper. Med. **41**:107, 1925.

10. Davies, H. W.; Haldane, J. B. S., and Kennaway, E. L.: J. Physiol. **54**:302, 1920.

11. MacAdam, W., and Gordon, J.: Lancet **2**:560 (Sept. 9) 1922; Ellis, Arthur, W. M.: Quart. J. Med. **17**:405 (July) 1924.

with alkalosis. Alkalosis has been reported in pyloric and duodenal obstruction by several writers.[12] Ellis quotes two cases of highly acid urine occurring during pyloric and duodenal obstruction, in the presence of an alkalemia and clinically gastric tetany.

CONCLUSION

In two cases of pernicious vomiting clinically suggestive of intestinal obstruction, studied only in the last day of life, the finding of marked reduction in blood chlorids was indicative of such a cause.

In one case the blood carbonate was markedly increased and in the other moderately increased, indicative of alkalosis. The urine was acid and contained acetone. Both patients died during a convulsion.

The nonprotein nitrogen was estimated in one case and was found markedly increased.

In both cases the duodenum presented adherent congenital bands causing traction, kinking and apparently partial obstruction.

Although in most instances importance must not be placed on congenital bands, the absence of other physical findings with the occurrence of a clinical picture of partial obstruction and the blood findings of greatly reduced chlorids are suggestive of duodenal obstruction as sometimes due to this cause.

In such cases it may be possible by early diagnosis to save life by operation and division of the obstructive bands, the risk being reduced by the timely therapeutic use of sodium chlorid.

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12. Brown, G. E.; Eusterman, G. B.; Hartman, H. R., and Rountree, L. G.: Footnote 5.

PROGRESS IN PEDIATRICS

RECENT WORK IN ANATOMY, PHYSIOLOGY AND PATHOLOGY OF INFANCY AND CHILDHOOD

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PATHOLOGIC REPORTS

An instance of indurated ulcer of the tongue due to *Oidium lactis* is reported by Wilkins and Bayne-Jones.[103] It appears to be a rare condition. The patient was an emaciated infant, aged 6 months. The ulcer was situated in the midline far back on the dorsum of the tongue, about 8 or 10 mm. in diameter, covered with a dirty grayish fur and was much indurated. Microscopic examination of stained sections of tissue removed from the edge of the ulcer revealed mycelial filaments. The organism obtained by culture was classified as *Oidium lactis,* Link, 1809; it is included in the genus *Oidium,* as amended by Pinoy to contain human parasites. It was obtained also in cultures from the stools, which had been diarrheal. It was agglutinated by the patient's serum and not by normal serum. The ulcer yielded readily to cauterizing with silver nitrate, and the fungus disappeared from the tongue and feces.

A case of thrush as a generalized disease is reported by Christison.[104] The patient was a girl, aged 5 years, and the duration of the infection was two and a half years. Grayish white patches appeared during her third year, following an attack of influenza. A diagnosis of thrush was made and the ordinary remedies were used for six months without appreciable benefit. Then vomiting appeared, accompanied by a fetid odor of the breath. Cutaneous lesions appeared that resembled ringworm, but showed the characteristic *Oidium albicans.* The cutaneous lesions became very severe. The lungs seemed to become involved, and the offensive odor of the breath in the early stages was suggestive of gangrene of the lungs. There was continuous vomiting, harassing cough, progressive emaciation and pronounced muscular weakness. Pulmonary attacks recurred, probably due to advancing thrush, and the child died from exhaustion. Laboratory findings repeated during the course of the disease confirmed the original diagnosis. Various scrapings and washed sputum all showed *Oidium albicans.* Necropsy was not obtained.

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103. Wilkins, Lawson, and Bayne-Jones, S.: Indurated Ulcer of the Tongue Due to Oidium Lactis, Am. J. Dis. Child. **26**:77 (July) 1924.

104. Christison, J. T.: A Fatal Case of Thrush Involving the Skin, Lungs and Nails, Am. J. Dis. Child. **26**:250 (Sept.) 1923.

An extensive study on thrush is reported by Epstein.[105] He found latent infection with thrush quite common in his material. In all cases of thrush in the infant, fungi of the same variety were previously present in the mouth of the mother. If the mother's mouth was free of fungi the child remained free. He advocates the use of a mouth wash in the mother before and soon after delivery.

An instance of bilateral suppurative parotitis in a recently born infant is reported by Volonté.[106] The infant had thrush, and the suppurative parotitis required incision; recovery was complete in a month.

TUBERCULOSIS

Since 1912, every tonsil and adenoid removed at operation in the Johns Hopkins Hospital has been studied histologically. While no attempt is made to examine the entire tonsil or adenoid by serial sections, the blocks selected for microscopic section and the number of slides obtained for study are uniform throughout the whole series of 3,260 cases. The procedure resulted in the discovery of 138 cases of tuberculosis of the tonsils or adenoids (half of them in children under 10 years of age). In forty-six cases there was an associated tuberculous cervical adenitis as found by microscopic examination of an excised gland. In the 3,260 cases there were eighty-five cases of tuberculous cervical adenitis, but an associated tuberculous infection of the excised tonsils or adenoids was demonstrated in only thirty-five. The remaining ninety-two cases of tuberculous infection of the adenoids or tonsils were without general or local manifestations of tuberculosis. Each of these patients had applied for treatment on account of discharging ears, frequent colds or attacks of tonsillitis, and a tuberculous lesion was not suspected until the excised tonsils or adenoids were examined microscopically.

From the material thus collected, MacCready and Crowe[107] have succeeded in obtaining a series of postoperative observations on fifty patients. Forty have been observed from five to ten years, and ten for at least two years, and each have been subjected to a general physical examination and a roentgen-ray examination of the chest at least once a year since removal of the tonsils and adenoids. The authors record it as their impression that tuberculosis of the tonsil is usually a bovine bacillus infection. They base this conclusion on the age incidence (over 50 per cent. of their patients were less than 10 years of age); the frequency of the involvement of the cervical and mediastinal lymph

105. Epstein, B.: Studies on Thrush, Jahrb. f. Kinderh. **104**:129, 1924.

106. Volonté, L.: Bilateral Suppurative Parotitis in Young Infants, Rev. méd. d. Uruguay **26**:220 (May) 1923; abstr. J. A. M. A. **81**:787 (Sept. 1) 1923.

107. MacCready, P. B., and Crowe, S. J.: Tuberculosis of the Tonsils and Adenoids. A Clinical and Roentgen-Ray Study of Fifty Cases Observed for Five Years After Operation, Am. J. Dis. Child. **27**:113 (Feb.) 1924.

glands; the strikingly low incidence of pulmonary, intestinal or other complications during the five or ten year period of postoperative observation, and the growth, appearance and excellent general physical condition of these children, in spite of the roentgen-ray evidence of tuberculosis of the mediastinum. Tuberculosis of the tonsils or adenoids is never recognizable from a gross appearance before operation unless there are superficial ulcerations secondary to an open pulmonary lesion. When tubercles are found on histologic examination, the infection is already widespread in the cervical, mediastinal and probably the mesenteric lymph glands. Since the majority of such patients may possibly never have clinical symptoms of tuberculosis, it is probably not advisable to alarm the family, stigmatize the patient as tuberculous or seriously interfere with his ordinary routine duties. It is possible that such a tuberculous infection of the lymphadenoid tissue in the throat, if not complicated with frequent secondary infection, is of value from the point of view of immunity. Removal of tonsils and adenoids in such cases may be of value, as it reduces secondary infection, but there is no evidence that by operation on the throat one can remove the only tuberculous focus in the body.

Generalized miliary tuberculosis is known to be due to softening of a focus of tuberculosis, usually on a lymph node, with discharge into a blood vessel. The discharge of tubercle bacilli may be so overwhelming and produce so extensive and generalized an infection as to prove fatal in a short time. More commonly, successive discharges occur and prove fatal.

However, it is conceivable that the focus of dissemination may be so small that the number of bacilli discharged may not produce a severe infection, and healing of the focus, after it has been evacuated, may take place. Under such conditions, the infection, while generalized, may not be sufficient to overwhelm the organism, and recovery may conceivably occur.

Miliary tuberculosis in adults, running a chronic course and unsuspected till revealed by roentgenograms, has been reported. An unsuspected and healed miliary tuberculosis in a boy, aged 14 years, with death occurring from quite a different cause, has been reported by Opie and Anderson.[108]

ECTOPIA CORDIS

An example of ectopia cordis is reported by Cosgrove and St. George.[109] It was found in a very much distorted and somewhat

108. Opie, E. L., and Anderson, H., cited by Baer: Am. Rev. Tuberc. **4**:629 (Nov.) 1920.

109. Cosgrove, S. A., and St. George, A. V.: Report of a Case of Ectopia Cordis, Am. J. Dis. Child. **27**:594 (June) 1924.

macerated stillborn fetus, weighing 4½ pounds. The heart and a portion of its vessels lay free on the chest wall, in a depression associated with a fissured sternum and lined by pericardial membrane. Incision of the four chambers of the heart showed them to be distinct cavities, with patent valvular orifices. The pulmonary artery and aorta were two distinct tubes. The report is illustrated. The authors attribute the lesion to failure of the bilateral anlages of the sternum to fuse, and resulting malpositions.

THE HEART

Carrington and Krumbhaar [110] report the findings of a heart weighing 136 gm. in an infant, aged 12 months. The normal size would be from 35 to 40 gm. at this age (Vierordt). Marked hypertrophy of the heart in infants and young children, without sufficient anatomic changes to explain the hypertrophy on the basis of ordinary pathologico-physiologic processes, has been reported in about twenty cases, the last contribution being that by Howland (1919). In the present case, a mild nephritis, myocardial fibrosis and anomalous coronary artery (arising from the pulmonary) are discussed as possible causes. Carrington and Krumbhaar think it probable that the condition includes hypertrophies due to various antenatal and postnatal factors, some of which are still unrecognizable, and is seldom, if ever, truly idiopathic. The condition would not appear to be especially rare, it would seem to be at least sometimes congenital; in these cases the symptoms have not appeared until the patients were from 2½ to 4½ years of age and the break in compensation is surprisingly disastrous. It is not established whether the increase in the size of the heart is due to hypertrophy of existing fibers, to hyperplasia, or to both.

Sutherland [111] describes a congenital aneurysm of the pulmonary artery in a girl, aged 4 years. She had suffered from "heart attacks," was averse to exercise, and during the last three months showed progressive signs of cardiac failure in the form of increasing breathlessness and edema of the lungs and extremities. Toward the end there was great enlargement of the right side of the heart with cyanosis.

At necropsy, an aneurysmal dilatation was found extending the whole length of the main pulmonary artery and the left pulmonary artery to the point where it entered the lung. The main vessel measured 1½ inches in diameter. The pulmonary orifice was normal. The heart was much enlarged, owing to hypertrophy of the right ventricle and enormous distension of the right auricle.

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110. Carrington, G. L., and Krumbhaar, E. B.: So-Called Idiopathic Cardiac Hypertrophy in Infancy, Am. J. Dis. Child. **27**:449 (May) 1924.

111. Sutherland, G. A.: A Case of Congenital Aneurysm of the Pulmonary Artery, Brit. J. Child. Dis. **20**:27 (Jan.-March) 1923.

The aneurysm was ascribable to some congenital defect of the pulmonary artery. The accompanying defects were a supernumerary toe, fused digits and a double toenail.

THE RESPIRATORY SYSTEM

Noback [112] finds that the development of the respiratory system in the embryonic period of man has been carefully worked out by a number of observers and the features of the process well known. On the other hand, the development of this system from the third fetal month to birth, in early infancy, later infancy, and childhood, has received little attention. This gap in our knowledge he endeavors to fill.

His material consisted of 102 fetuses and full-term new-born infants, midsagittal sections of two children, aged 5 and 8 years, respectively, and other preparations. Numerous references to the literature are given, also notes on lobation of the lungs.

It is found that the descent of the respiratory system in relation to the vertebral column during childhood is not peculiar to this period in the development of the individual. It is merely a stage in a process which is already manifested in early fetal life and which continues to operate through infancy, childhood and maturity.

DeBuys and Samuels [113] made 450 observations on true anteroposterior exposures in new-born infants and in infants aged from 6 months to 1 year. They report that the shadow of the thymus does not gradually increase or decrease at this age. It may vary in the same infant at different periods within the first year, and the variation may exist without clinical evidence of disease.

Nor does the heart appear to rotate during the first year. It does increase in size and this increase seems uninfluenced by the increase and growth of the thymus. The great blood vessels show decided lengthening.

The importance of seeking evidences of bronchopneumonia in cases of unexplained sudden death in infants is emphasized by Duvoir.[114]

Tuberculous cavities in infants are the result of caseous pneumonia, according to Siperstein and Bauguess,[115] who submit a case of tuberculous pulmonary cavity, confirmed at necropsy, in a colored boy, aged 2 years; these authors review the literature with especial regard to

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112. Noback, G. J.: The Developmental Topography of the Larynx, Trachea and Lungs in the Fetus, New-Born, Infant and Child, Am. J. Dis. Child. **26**: 515 (Dec.) 1923.

113. DeBuys, L. R., and Samuel, E. C.: Further Observations on the Shadows of the Thymus and the Heart, South. M. J. **17**:260 (April) 1924.

114. Duvoir, M.: Suspicious Death of Infants, Medicine **4**:508 (April) 1923.

115. Siperstein, D. M., and Bauguess, H.: Tuberculous Pulmonary Cavities in Infancy, Am. J. Dis. Child. **27**:586 (June) 1924.

incidence up to 2 years of age. While our own literature is surprisingly meager, the French literature, especially, supplies numerous instances. A review of available case reports is submitted. In the present instance, a prolonged period of observation (two months) gave opportunity for careful clinical and roentgen-ray studies, showing progressive formation of the cavity, and the diagnosis made during life was confirmed at necropsy.

A case of pneumothorax as a complication of tuberculosis in infancy is reported by Ross and Crowdy.[116] The condition is uncommon and the patient (aged 5 months) was thought to be the youngest on record (Bourne's patient [1921] was 18 months old). The patient was exposed to his father who was suffering from advanced pulmonary tuberculosis. Cough persisted from the age of 3 months, and at this age shadows found at the hilum were suggestive of tuberculosis. A definite shadow appeared in the middle part of the left lung. It seems that here a caseous mass broke through into the pleural cavity at the age of 5½ months, following a suddent attack of acute dyspnea with violent coughing lasting for several minutes, when a condition of pneumothorax was diagnosed. The patient died eight days later, and necropsy revealed two perforations in the visceral pleura near the midlateral aspect which communicated with a pulmonary cavity; this in turn communicated with a main branch of the bronchus.

Another and rather recent case is that reported by Schoenstein[117] in an infant, aged 8 months. Diagnosis was made with the roentgen ray during life, and necropsy revealed a tuberculous cavity which had ruptured through the pleura.

Baer[118] reports a case of healed miliary tuberculosis in a white boy, aged 11 years, who was brought to the hospital because of asthmatic attacks daily from early years. His temperature was normal; the adenoids and tonsils had been removed at 5 years. An intracutaneous injection of tuberculin (0.1 mg.) produced no reaction. A roentgenogram of the chest revealed small opaque areas scattered throughout both lungs, even to the margins. There was no evidence of an accumulation of these in the vicinity of the root of the lungs. Stereoscopic plates showed that the nodules were situated in the lung substance. The nodules were, roughly, uniform in size and appeared to be small areas of calcification. Roentgenograms of other parts of the body showed nothing similar. The child had had pertussis at 8 years and influenza,

116. Ross, G. S., and Crowdy, C. T.: Tuberculous Pyopneumothorax in an Infant Aged Five Months, Am. J. Dis. Child. **27**:456 (May) 1924.

117. Schoenstein, E.: Sopra un caso di pneumotorace spontaneo in un bambino di 8 mesi, Pediatria **29**:535 (June 15) 1921.

118. Baer, Ridgely, W.: Report of a Case of Healed Miliary Tuberculosis, Am. J. Dis. Child. **27**:110 (Feb.) 1924.

followed by pneumonia, at 10 years of age. Subsequent tuberculin tests were made; there was a definite reaction on injection of 5 mg. of tuberculin intracutaneously.

The possibility of metastasis of some primary undiscovered tumor semed eliminated by the length of time that had elapsed. The roentgenograms were strikingly similar to those taken postmortem in Opie and Anderson's case.

Cautley [119] describes a cyst of the right lung in an infant, aged 19 weeks, the case being deemed worthy of record as a pathologic curiosity of doubtful causation. Breathing had become distressed a week earlier, the chest more prominent and attacks of cyanosis had supervened. There was absence of respiratory murmur over the right lung. The chest became markedly hyperresonant, and the infant died with no undue distress.

On opening the chest, a large red cyst was seen to fill the right side of the thorax and to extend to the left edge of the sternum; it collapsed on puncture, only containing air. The right lower lobe was collapsed; a small air-containing tongue-like process of lung tissue represented the upper lobe. The tumor replaced the other parts, its posterior wall and base being formed by airless lung tissue. The bronchi were patent, but no communication with the air cyst was found.

It seemed possible that the onset of symptoms, six weeks before death, was due to a previously existing orifice becoming closed. It is even possible that air was able to enter the cyst and was prevented by a valve-like opening from escaping, thus causing gradually increasing pressure and a fatal issue. Death appeared to be due to collapse of the left lung.

Although new growths of the mediastinum in childhood are very rare, the possibility of their occurrence should be borne in mind in the differential diagnosis of obscure intrathoracic conditions, says Rosenson,[120] in reporting a case of ganglioneuroma of the mediastinum in a girl, aged 8 years, which escaped recognition for over a year, while the child suffered from persistent and harassing cough, slight dyspnea, progressive weakness and loss of weight. There were occasional attacks of vomiting and at times short periods of irregular fever. Flatness on percussion and markedly diminished vesicular breathing were found on the right side of the chest, with slight displacement of the heart. Roentgen-ray examination revealed a large, sharply defined shadow which occupied the region of the right upper lobe, extending to the third rib anteriorly. This was interpreted as an encapsulated effusion, and a less

119. Cautley, Edmund: A Cystic Malformation of the Lung, Brit. J. Dis. Child. **21**:138 (April-June) 1924.

120. Rosenson, W.: Neoplasms of the Mediastinum in Infancy and Childhood, Am. J. Dis. Child. **26**:411 (Nov.) 1923.

dense shadow at the right base as an unresolved pneumonia. Narrowing of the right palpebral fissure and enophthalmos and contraction of the pupil on the right were also present. However, operative intervention by "an extrapleural approach through an incision posteriorly over the right upper lobe in the region of the sixth and seventh ribs near the spine" revealed a large tumor mass, about the size of a tennis ball, in the posterior mediastinum. This was completely removed in two stages. Microscopic examination showed the mass to be a ganglioneuroma, a neoplasm composed of ganglion cells and nerve fibers, usually originating in the sympathetic system, and commonly benign. The patient's general condition improved.

Thirty-eight cases of mediastinal new growths in infancy and childhood have been described in the literature: sarcoma, 15; carcinoma, 9; dermoid cyst, 6; lymphadenoma, 4; from thymus of unknown character, 2; lipoma, 1; ganglioneuroma, 1. The sarcomas arise most commonly from the thymus gland. The correctness of the diagnosis of carcinoma may be doubted in some of the cases. Dermoid cysts are relatively more common than the figures would indicate, since, though congenital tumors, the symptoms are not usually manifest until adult life. In the six cases the symptoms did arise before adolescence; the youngest patient was an infant. The case of lipoma was in a child, aged 1 year.

In a review of the literature of ganglioneuroma up to 1915, Dunn [121] found records of fifty-one cases. Seventeen of them were in children, but in none of them was the mediastinum or thorax involved. The one other case of ganglioneuroma of the mediastinum in childhood is that of a child, aged 2½ years, described by A. P. Stout.

STOMACH AND PANCREAS

Sauer [122] employed a new mode of attack in attempting to prove whether a true hypertrophy in hypertrophic pyloric stenosis of infancy exists. A dozen or more investigators have attacked this problem, and have disagreed widely as to the relative size of the muscularis of the pylorus in the fetus, in the full-term infant and in the infant with pyloric stenosis. Pfaundler emphasized the influence that the state of contraction of the normal stomach exerts on the thickness of the various parts, and demonstrated the similarity in anatomy of the normal systolic stomach and the hypertrophic pyloric stenosis stomach. He found the greatest thickness of the pylorus in the former to be 3 mm., and in the latter to range from 3 to 5 mm. Wernstedt, filling the immersed stomach and exerting a water pressure of 30 cm. or more, found the normal

121. Dunn, cited by Rosenson: J. Path. & Bacteriol. **19,** 1915.

122. Sauer, L. W.: Pyloric Hypertrophy in Hypertrophic Pyloric Stenosis, Am. J. Dis. Child. **27**:608 (June) 1924; Hypertrophic Pyloric Stenosis. A Monographic Review, Arch. Pediat. **41**:145 (March) 1924.

pyloric muscularis to average only 1 mm. in thickness, and that of the hypertrophic pyloric stenosis case to range from 1.5 to 2.5 mm. Most investigators have reported the hypertrophy to involve the circular muscle layer, but Finkelstein reported a case in which the longitudinal layer was hypertrophied. Ibrahim and others agree that the individual muscle cells and nuclei are larger in the hypertrophic pylorus cases than in normal contracted stomachs, and interpret their findings as proof of a true hypertrophy of the individual muscle cells. Hertz found the diameter of the muscularis in two normal infants was 2,380 and 2,550 microns respectively; in some of his seventy new-born and prematurely born infants it reached 2,550 and 2,770 microns; and in his six pyloric stenosis cases it varied from 2,720 to 5,100 (average from 3,000 to 4,000) microns, showing that the value for some normal and prematurely born infants may approximate the lowest values in his hypertrophic stenosis cases.

The objections have been raised that it is almost impossible to obtain two stomachs in the same state of contraction; that fixing fluids exert marked influence on the contraction of the pylorus; that it is difficult to section specimens in exactly the same plane, and that the micron is a very small unit of measure anyhow. Pfaundler took the stand that the pylorus in hypertrophic pyloric stenosis is merely in a state of spasm, and Haas stated that the condition is an advanced degree of pylorospasm.

Sauer found the stomachs of two infants approximately similar in birth weights, feeding histories, ages and weights at time of death (fifty odd days). In one, the diagnosis was appendicitis and peritonitis, in the other, hypertrophic pyloric stenosis and bronchopneumonia.

The stomachs were handled and fixed in like manner, and after dissection the two pylori were passed simultaneously through the various dilutions of alcohol, ether and celloidin. Serial longitudinal sections of 50 microns thickness were then made and stained. According to the Born method, the muscularis of the pylorus was then reconstructed from serial wax plates 2 mm. thick.

Microscopic examination of the stained longitudinal sections of both pylori showed the presence of four layers: (1) Tunica serosa (visceral peritoneum); (2) tunica muscularis consisting of (*a*) an outer longitudinal layer (stratum longitudinale) and (*b*) an inner circular (stratum circulare); (3) tela submucosa, an appreciable layer of loose connective tissue, elastic fibers, fat, and blood vessels; and (4) tela mucosa, the thin, innermost layer of mucous membrane.

The striking difference in the two specimens was the marked increase in the stratum circulare of the tunica muscularis in the stenosis specimen. The greatest diameter measured 3,850 microns, that of the control 2,500. That an actual increase in muscle tissue occurs in pyloric stenosis is held to be shown conclusively by comparison of the weights of the two

models, 3,000 and 6,000 gm. respectively. The lumen of the control model is somewhat funnel shaped; that of the stenosis model resembles the letter X. The article is illustrated.

Moore [123] reports the unique occurrence of hypertrophic pyloric stenosis developing simultaneously in twins and running quite parallel courses. Vomiting began in the second week; the Rammstedt operation was performed at the end of the fourth week; vomiting ceased but death followed, apparently from respiratory failure, after fifty-two hours in one patient and after eight days in the other.

Lassalle [124] thinks diabetes in infants is comparatively common. He describes cases of diabetes in children in which loss of weight with good appetite and dryness of the skin were about the only signs of disturbance, there being no polydipsia or polyuria. In a young, breast-fed infant the liver was large and the skin extremely dry; in a girl, aged 6 years, who was very thin, the skin was dry and pimply.

Gallie and Brown [125] call attention to two cases of severe pancreatitis that have been described, in which round-worms entered the ampulla of Vater and worked their way into the pancreatic duct. One was found at necropsy (Rigby), the other patient was operated on and the round-worm removed (Novis) with successful result. They then record the case of a boy, aged 2½ years, who was seized suddenly with severe pain in the abdomen, doubling over and turning pale, and then vomiting frequently for hours, when the pain, which had been continuous for nine hours, suddenly ceased. A tumor suggestive of intussusception, but too thin and too fixed, was found. When explored, it was found to be the pancreas, covered with acutely inflated and swollen omentum, hemorrhagic and studded with areas of fat necrosis. Blood-stained fluid was mopped out of the peritoneal cavity and the abdomen was closed. The patient recovered. Fifteen hours after operation, the patient was noted to be gagging and the nurse extracted a full-sized round-worm from his mouth. The authors are of the opinion that the symptoms were produced by the round-worm, which had either introduced its head into the ampulla of Vater, thus allowing a back flow of bile or intestinal juices into the pancreas, or had created such an irritation in the duodenum that the ampulla became closed off by the resulting inflammatory reaction. No more worms were found.

Leebron [126] describes the operative findings in a fatal case of intestinal obstruction in a girl, aged 36 hours. The intestine presenting in

123. Moore, L. H.: Twins with Hypertrophic Pyloric Stenosis, South. M. J. **17**:187, 1924.

124. Lassalle, M.: Diabetes in Children, Arch. de méd. d. enf. **26**:423 (July) 1923.

125. Gallie, W. E., and Brown, Alan: Acute Hemorrhagic Pancreatitis Resulting from Round Worms, Am. J. Dis. Child. **27**:192 (Feb.) 1924.

126. Leebron, J. D.: Intestinal Obstruction from Volvulus in Utero in Gangrene and Peritonitis in the New-Born, Arch. Pediat. **41**:281 (April) 1924.

a high rectus incision was gangrenous. "When this was delivered, it was found that the obstruction was due to volvulus. This volvulus was caused by a twist of the mesentery, producing strangulation of a loop of small bowel involving the lower jejunum and upper ileum." There was extensive peritonitis, and cultures of the intestinal fluid yielded colon bacilli. The labor had been somewhat protracted.

A case of intestinal obstruction in early life (the child was aged 2 months), due to hemangio-endothelioma of the ileum, is reported by Blahd, Mashke, and Karsner.[127] The symptoms were those of intestinal obstruction of acute onset. No tumor was palpable. Exploration revealed a tumor constricting the ileum at a point about 18 cm. from the ileo-cecal valve. Subsequent examination of the tumor showed a capillary angioma, with blood in most of the capillaries which was found in the mesentery and in all the coats of the intestine except the mucosa proper. This angioma was obviously of vascular character and nothing was found to justify consideration of epithelial origin. It seems probable that the condition was congenital.

Miller and Neff [128] describe a true intestinal stone measuring 3.5 by 5 cm., causing chronic obstipation in an infant, aged 8 months. The child was breast-fed, fairly well nourished, but had never had an unassisted movement; abdominal distension was present. Under anesthesia a hard, globular mass was easily felt in the region of the umbilicus. A right rectus incision revealed a redundant loop of sigmoid, much enlarged in length and in caliber, and containing a mass that could be moved slightly in both directions within the bowel. The stone was oval, 3.5 by 5 cm. in size, weighed 40 gm., and was dark gray and smooth. The outside was stony hard and laminated; the inside was less dense but was not different in composition. Chemical analysis seemed to indicate that it was a stone of purely intestinal origin.

True intestinal stone in early life appears to be rare, no report of another case in a child under 6 years of age being found. It has been suggested by Pfahler that the stone, if of sufficient density, should first be sought by roentgenogram without barium sulphid, and if this procedure is inconclusive, the opaque meal will outline the mass, which of itself may be of insufficient density to cast a shadow.

Steinko [129] found that an enema, even as small as 50 c.c., reflexly stimulates peristalsis of the whole colon.

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127. Blahd, M. E.; Mashke, A. S., and Karsner, H. P.: A Case of Hemangio-Endothelioma of the Ileum, Am. J. Dis. Child. **26**:379 (Oct.) 1923.

128. Miller, E. L., and Neff, F. C.: Enterolith as Cause of Chronic Obstipation in a Breast Fed Infant, Am. J. Dis. Child. **27**:105 (Feb.) 1924.

129. Steinko, R.: Roentgenologic Examination of Enemas in Infants, Monatschr. f. Kinderh. **26**:166 (May) 1923; abstr., J. A. M. A. **81**:788 (Sept.) 1923.

THE KIDNEYS AND SUPRARENALS

A case of mixed-cell sarcoma of the kidney in an infant, aged 11 months, with successful operative removal, uneventful recovery and good health twelve years later, is reported by Fry.[130] The mass was in the left quadrant, roughly quadrilateral, extremely hard, and moved vertically with respiration. Microscopically, it was a mixed cell sarcoma. Kidney function was found normal at the age of 12 years.

Thomas [131] brings the literature of the suprarenal up to date. He finds that Addison's disease is rare in children, but that hemorrhage into the gland is not so uncommon and is usually fatal in twenty-four hours.

Corcoran and Strauss [132] report a case of suprarenal hemorrhage in the new-born, with operation and recovery. There are reports of about 100 cases of extensive suprarenal hemorrhage in the new-born, but no other case is found in which operation was performed with recovery. Clinically, the condition resembles a progressing internal hemorrhage. In this case the signs of pressure on adjacent organs was so definite as to constitute a typical picture of hemorrhage in or about the left suprarenal capsule.

The birth was precipitate; the baby weighed 12¼ pounds, cried, and seemed a normal infant, nursing regularly. On the fourth day he ceased to nurse and became restless, fever appeared, with vomiting, loose stools and pallor, and he was aroused with difficulty. A mass, which at first was thought to be an enlarged spleen, was felt. On the fifth day the mass extended into the pelvis and caused bulging of the left lower side of the abdomen. Roentgenograms following barium enema showed a barium-filled rectum, but a complete barrier prevented even a trace entering the descending colon. Fecal vomiting was repeated.

An incision revealed a very large hemorrhage within the intact suprarenal capsule; the contained blood was sterile. A persistent bleeding point at the outer pole of the suprarenal gland was ligated. A small drain was placed in the cavity and the wound, similar to a kidney incision, was closed in the usual manner. Food was soon greedily taken, the anemia cleared up, and a few months later the baby appeared to be normal in every respect.

PELVIC CONDITIONS

Two cases of acute pelvic abscess in infancy, rupturing into the vagina, are reported by Rosenblum and Bettman.[133] The condition seems

130. Fry, F. M.: Mixed Cell Sarcoma of Kidney in Child Eleven Months Old, Canad. M. A. J. **14**:518 (June) 1924.

131. Thomas, E.: Suprarenals, Monatschr. f. Kinderh. **27**:343, 1924.

132. Corcoran, W. J., and Strauss, A. A.: Suprarenal Hemorrhage in the New-Born, J. A. M. A. **82**:626 (Feb. 23) 1924.

133. Rosenblum, P., and Bettman, R. B.: Acute Pelvic Abscess in Children, Am. J. Dis. Child. **27**:336 (April) 1924.

to be rare. The patients were aged 2 and 9 months respectively; breaking down of infected retroperitoneal lymph glands seemed to have been the cause of the condition, though pyosalpinx must be considered as a contributing factor. Recovery followed in both cases.

In older children, localized peritonitis associated with appendicitis or with gonorrheal vulvovaginitis, localized pneumococcic peritonitis, pyosalpinx and spondylitis are among the possible causes. Two cases in older children are reported—a girl, aged 5, and a boy, aged 9 years, in which these seemed to be excluded, leaving broken-down infected retroperitoneal lymph glands as a cause. In the boy, exploratory laparotomy showed a large boggy mass of swollen retroperitoneal lymph glands in the right lower quadrant; the appendix was normal.

On account of the extreme rarity of the condition in very young infants, Rost [134] reports an instance of twisted ovarian pedicle in an infant aged four months. The illness had begun by what appeared to be abdominal cramps, followed by vomiting. The symptoms had persisted for nearly a week when the infant was seen and a tentative diagnosis of acute appendicitis with abscess was made. Exploration revealed a twisted right ovary, which appeared to be gangrenous but was not cystic. There was some free fluid in the abdominal cavity; the appendix was normal and the child subsequently recovered. As marked constipation had been present since birth and the stools when passed were dry and hard, it is suggested that severe straining may have been an etiologic factor.

Moench [135] reports a fatal case of hematocolpos in a child, aged 6 weeks, who was found dead in bed. The hymen was imperforate and the vagina was dilated to the size of a golf ball by a collection of old blood. There was more old tarry blood in the anterior perietal peritoneum, which had evidently come from a small cyst of the right ovary. The cervix was slightly eroded. The probable diagnosis was either precocious menstruation or acute inflammation with hemorrhage. Pulmonary edema was marked; there was no evidence of hemorrhagic diathesis.

An instance of mixed tumor of the cervix and vagina in an infant, aged 10 months, is reported by McLean and Wollstein.[136] The literature contains records of sixteen cases of primary mixed neoplasms of the vagina in children, aged from 6 months (Hauser) to 7 years (Demme), and four undoubted cases of primary mixed tumors of the cervix. The present case makes the third in which both cervix and vagina were

134. Rost, W. L.: Twisted Ovarian Pedicle, Arch. Pediat. **40**:787 (Nov.) 1923.

135. Moench, G. L.: Hematocolpos in a Child of Six Weeks, Am. J. Obst. & Gynec. **7**:471 (April) 1924.

136. McLean, S., and Wollstein, M.: A Mixed Tumor of the Cervix and Vagina in an Infant, Am. J. Dis. Child. **26**:69 (July) 1923.

involved. The cervix was probably the point of origin, but this could not be proved. A specimen taken at necropsy showed the growth to be a rhabdomyosarcoma. The tumors here considered are congenital and are believed to originate from cells of the mesoderm, the undifferentiated cells being transported to the seat of their later development (uterus or vagina) by the wolffian duct as it grows caudalward. They are not necessarily fatal.

Sarcoma of the body of the uterus is exceedingly rare in children; Rosenstein (1883) reported such a case in a child not 2 years old.

ARTHRITIS—COLON BACILLURIA—PHLEBITIS—GANGRENE

A case of acute gonorrheal arthritis developing in an infant eighteen days after birth is reported by Ross.[137] The father had gonorrhea just before marriage; the mother developed a vaginal discharge during pregnancy, and one week postpartum a multiple arthritis, which was diagnosed as gonorrheal. The infant appeared healthy at birth; a slight conjunctivitis developed after repeated treatment with silver nitrate and cleared up within a week. On the morning of the seventeenth day, the infant's temperature rose to 101 F.; he cried loudly, especially on being moved, and signs of arthritis were found in the left wrist and hand. Later, swelling of the left knee joint with definite fluctuation was noted. Aspiration yielded several cubic centimeters of frank greenish pus. The smear revealed no organisms, but gonococci were obtained from the culture. Later, it became necessary to open the knee joint; recovery was uneventful.

An instance of acute colon bacillus infection in a new-born baby, contracted from the mother, is recorded by Jewesbury and Dudgeon.[138] The mother had been suffering from an infection of the urinary tract. The baby was thought to have been infected at birth by swallowing urine or lochia, for both contained masses of bacilli and pus. Repeated examinations of the mother's milk failed to disclose colon bacilli. The baby's illness began three days after birth and continued with gastro-intestinal symptoms. Colon bacilli were present in the mucus from the bowel, and eighteen weeks after that in the mucus expelled by mouth, at which time a colon bacilluria was also present. The illness was prolonged and severe, but ended in recovery.

A case of postscarlatinal phlebitis in a boy, aged 6 years, is reported by Huenekens and Siperstein.[139] The apparent rarity of this condition,

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137. Ross, S. G.: Gonococcal Arthritis in New-Born Male Infant, Canad. M. A. J. **13**:437 (June) 1923.

138. Jewesbury, R. C., and Dudgeon, L. S.: Acute Bacillus Coli Infection of Gastro-Intestinal Tract, in New-Born Baby Contracted from Its Mother, Lancet **2**:118 (July 21) 1923.

139. Huenekens, E. J., and Siperstein, D. M.: A Case of Postscarlatinal Phlebitis, Am. J. Dis. Child. **24**:447 (Nov.) 1923.

the extensive involvement of both lower extremities, with the presence of necrotic, gangrenous areas, the formation of a vast compensatory collateral circulation, and finally, the recovery of the patient following purely symptomatic treatment, all make the case of unusual interest. A case of a girl, aged 4½ years, reported by Moizard and Ullman (1902) resembles this one. There a diagnosis of phlebitis of the axillary and brachial veins was made; *Streptococcus pyogenes* was obtained from blood culture and the patient recovered.

A case of gangrene of both legs, following bronchopneumonia in a colored boy, aged 6 years, is reported by Harrell.[140] Gangrene of both feet and the lower two-thirds of the legs was caused by blocking of both popliteal arteries by a portion of thrombus. Recovery followed amputation of both legs above the knees.

Examination of the literature revealed no other case of bilateral gangrene following pneumonia. Other causes given for gangrene in children are: burns, local actions of chemicals, diseases of the nervous system (Raynaud's disease), constitutional diseases (hemophilia, purpura and diabetes), thrombosis and embolisms, and gangrene following measles, scarlet fever, diphtheria, varicella, erysipelas and typhoid fever.

NUTRITIONAL DISTURBANCES

It has been known for some time that xerophthalmia keratomalacia will develop in animals maintained on a diet deficient in fat-soluble vitamin A.

The literature on keratomalacia in infants has been reviewed recently by Ross.[141] Bloch,[142] in a well illustrated article, relates his experience with xerophthalmia in Denmark, where from six to seven hundred cases occurred between 1909 and 1920 among children, in a population of less than 3,000,000, due to the fact that, during the war, butter, and consequently fresh milk, in this butter-exporting country, became so expensive that the poor could procure scarcely any, and were often able to obtain separated milk and buttermilk only.

Wilson and DuBois[143] report a fatal case of keratomalacia in an infant, with postmortem examination. The child was 5 months old;

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140. Harrell, H. P.: Report of a Case of Gangrene of Legs Following Bronchopneumonia, Am. J. Dis. Child. **27**:562 (June) 1924.

141. Ross, S. G.: Nutritional Keratomalacia in Infants, Am. J. Dis. Child. **22**:232 (Sept.) 1924.

142. Bloch, C. E.: Blindness and Other Diseases in Children Arising from Deficient Nutrition (Lack of Fat Soluble A Vitamin), Am. J. Dis. Child. **27**: 139 (Feb.) 1924.

143. Wilson, J. R., and DuBois, R. O.: Report of a Fatal Case of Keratomalacia in an Infant, with Postmortem Examination, Am. J. Dis. Child. **26**: 431 (Nov.) 1923.

she had been normal at birth, nursed for one month, was given a top-milk mixture for one month, and then for three months was fed on a 1:10 dilution of condensed milk: "a food deficient in fat-soluble A vitamin." At first she took this well, but for two months had refused large quantities, until the total daily intake rarely exceeded 10 ounces; she failed to gain but had no gastro-intestinal upsets. In the last week the parents had noted that the eyes appeared dull, as if covered by a film. The child became drowsy, and was markedly under-developed and emaciated. The skin was found to have a distinctly waxy feel. In spite of diabetic treatment, relief of the dehydration and administration of cod liver oil, the infant remained semistuporous, corneal ulcers developed and perforation occurred, and the child died after nineteen days.

At necropsy the eye lesions were the most striking gross lesion. Microscopically, changes were found in many organs: inflammatory lesions in the lachrymal and salivary glands; peculiar cell changes in the epithelium lining the submaxillary and parotid gland ducts; keratinization of the epithelium of certain ducts in the pancreas and inflammatory conditions; karatinization of the tracheal epithelium and associated changes, and change of columnar epithelium to a stratified keratinization in the uterine mucosa, bronchi and pancreatic ducts. Photomicrographs accompany the report.

Stransky [144] came to the conclusion that xerophthalmia is dependent on a lowered resistance of the whole body, and especially of the cornea, to infection of any kind. Such lowered resistance may have been due to avitaminosis or hypervitaminosis or to enteral or parenteral infections. In this latter case vitamin A is without effect on xerophthalmia. The author presents two cases.

Rickets, as it appeared in Vienna, is considered at great length in the special report of the Medical Research Council of Great Britain. The report is reviewed by Wright.[145] Rickets was divided into two types: (1) rickets with low blood calcium and normal phosphorus, and (2) rickets with low blood phosphorus and normal calcium.

In a study of gastric acidity in infantile tetany, Babbott, Johnston and Haskins [146] conclude that lowered gastric acidity and diminished gastric emptying time are found in manifest infantile tetany, and that there is a return of the gastric content to normal acidity and of the gastric motility to normal activity coincident with the rise of serum

144. Stransky, E.: Etiology of Keratomalacia, Jahrb. f. Kinderh. **104**:183 (Feb.) 1924.

145. Wright, H. P.: Note on the Clinical Signs of Infantile Rickets as Observed in Vienna, Canad. M. A. J. **14**:320 (April) 1924.

146. Babbott, F. L., Johnston, J. A., and Haskins, C. H.: Gastric Acidity in Infantile Tetany, Am. J. Dis. Child. **26**:486 (Nov.) 1923.

calcium to normal and with the disappearance of clinical symptoms of tetany.

They review some of the evidence pointing to the necessity for adequate acidity for calcium absorption, as offered in the relatively new method of treatment of tetany, by adding acid or acid-forming substances to the diet, and note Marriott's statement that he has never seen tetany develop in a baby fed on lactic acid milk. Then, asking why a rachitic child should suddenly develop tetany, they state that most cases of tetany give a definite history of infection with fever at the onset of manifestations of the disease, and that it has been shown that fever, both in laboratory animals and in infants, is responsible for a sudden and marked diminution of gastric acidity and of gastric motility. (These authors are now investigating whether or not there is a slightly diminished gastric acidity in rickets before the onset of tetany.)

The following chain of events then suggests itself to them as a possible mechanism of the production of tetany in many infants. A rachitic infant develops an infection with fever, which, in turn, gives a diminished gastric acidity. The gastro-intestinal contents, therefore, afford a less favorable medium for calcium solution and calcium assimilation. This results in a lowering of the calcium content of the blood, which is responsible for the symptoms of tetany.

Scheer and Salomon [147] report further observations on the beneficial effect of hydrochloric acid milk in tetany. It was found to cause decrease in serum phosphorus and increase in calcium.

Bloch,[148] in concluding his paper on deficient nutrition, gave it as his conclusion that rickets and xerophthalmia are very rarely met with in the same child, and that rickets can therefore hardly be due to the absence of the fat-soluble A factor.

Scurvy in childhood, as it appeared in Russia in the recent famine years, is described by Schagan.[149] The cases appeared chiefly in the spring (55 per cent.), and, to a less extent, in the summer (32 per cent.). The highest incidence was in children, aged from 2 to 5 years. The mortality reached 16 per cent.; the stomatitis became gangrenous in 13 per cent. of the cases. The bone marrow was involved in the toxicosis. Latent tuberculosis was activated. The diet had a sufficient caloric content, but was almost lacking in the antiscorbutic vitamin C.

147. Scheer, B., and Salomon, A.: Action and Effect of Hydrochloric Acid Milk in Tetany, Monatschr. f. Kinderh. **27**:416, 1924.

148. Bloch, C. E.: Blindness and Other Diseases in Children Arising from Deficient Nutrition (Lack of Fat Soluble A Vitamin), Am. J. Dis. Child. **27**: 139 (Feb.) 1924.

149. Schagan, B.: Scurvy in Childhood, Jahrb. f. Kinderh. **104**:225 (Feb.) 1924.

THE NERVOUS SYSTEM

De Angelis [150] concludes, from a study of reflex in the new-born, that almost all reflexes are present at birth, and only exceptionally does some one of them not appear until some time during the first months. The great variety of the reflexes in the new-born, in modification and intensity, makes it impossible to attach to them the same importance as in the adult. It may be that the presence or absence of reflexes in the new-born may have pathognomonic importance.

Peiper [151] reports finding the sense organs of prematurely born babies just as prompt in responding to stimuli as those of full-term infants. He tested the effect of sound, light, pain and cold stimuli in the respiration of the sleeping infant, as recorded on a kymograph tracing by means of a Marey tambour. He suggests the use of this method to test sensation in infants.

McLean and Gilmartin [152] report a case of cerebrospinal meningitis with purulent iridochoroiditis in a girl, aged 18 months, with full recovery, the favorable result being attributed to the use of antimeningococcic serum given by the intravenous as well as by the intraspinous route.

Brown [153] shows photomicrographs of the skin lesion in a meningococcus septicemia in a girl, aged 2 years. An acute illness of two days' duration, accompanied by stiff neck, hyperemic nasopharynx, a temperature of 104 F. and a skin condition not unlike measles eruption over the face and extremities, was followed by rapid change of the eruption to large purpuric spots and subsequent death of the child. Blood cultures during life yielded pure cultures of meningococcus; the spinal fluid was clear and its cell count was not increased. It is suggested that demonstration of the meningococci in smears of the blood and tissue juices from the purpuric areas (Netter and Salanier) may gain time in establishing a diagnosis and instituting appropriate serotherapy.

A case of meningitis, due to *Micrococcus catarrhalis*, in a girl, aged 5 years, is reported by Garland.[154] It was complicated by pertussis and acute otitis media and ended fatally, but necropsy was not obtained. Three other cases due to the same organism have been collected, one in an infant, aged 7 weeks.

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150. De Angelis, Francesco: Reflexes in the New-Born, Am. J. Dis. Child. **26**:211 (Sept.) 1924.

151. Peiper, A.: Sense Perception in the Premature Born, Jahrb. f. Kinderh. **104**:195 (Feb.) 1924.

152. McLean, S., and Gilmartin, H. A.: Cerebrospinal Meningitis with Purulent Iridochoroiditis with Recovery. Report of a Case, Am. J. Dis. Child. **27**:603 (June) 1924.

153. Brown, C. L.: The Skin Lesions in Meningococcus Septicemia, Am. J. Dis. Child. **27**:598 (June) 1924.

154. Garland, Joseph: A Case of Meningitis Due to Micrococcus Catarrhalis, Am. J. Dis. Child. **26**:600 (Dec.) 1923.

A case of xanthoma tuberosum with diabetes insipidus and jaundice, described clinically in 1922, with the findings at necropsy is reported by Griffith.[155] The disease itself is a rare one and the present case, in its combination of symptoms, is almost unique. The cutaneous lesions had been present for over two years, polyuria and excessive thirst for over a year; jaundice appeared earlier. At necropsy the chief interest was the condition of the pituitary body. It was not enlarged or altered in any way materially in shape, but the posterior lobe was thoroughly infiltrated by xanthomatous tissue and the anterior lobe was affected to some extent. This explained the disturbed function of the pituitary in the production of diabetes insipidus.

Two papers on neuropathy in infancy are those of de Lange[156] and White.[157] The former describes three atrophic infants, who lay with the head habitually thrown far back, were pale, with high hemoglobin ("angiospastic pallor"), and who showed one or more other peculiarities such as abnormalities of respiratory rhythm, visible peristaltic waves or habitual vomiting. These neuropathic symptoms disappeared with the dyspepsia, but in the writer's opinion these infants will probably, in their future life, be afflicted by eneuresis nocturna, somnambulism, pavor nocturnus, tics, nervous anorexia and phobias; in short, by any of the manifold expressions of a disturbed nervous system. This dignosis of neuropathy in infancy is only to be made in exceptional cases in which long observation has shown that there is no rigor, no opisthotonus, but that on the contrary the muscles are flaccid. "As a rule, an infant that lies with its head bent backward is suffering from some organic disease." The phenomenon of periodic or intermittent respiration is discussed at length.

White's paper is based on clinical observations and the experimental work of others. He reaches the conclusion that congenital hypertrophic pyloric stenosis is a congenital malformation, not related to pylorospasm. The term pylorospasm he would abandon in favor of the term gastroenterospasm; this he regards as a manifestation of autonomic imbalance which may occur in adults as well as in children.

The principal clinical manifestations of the condition are (*a*) great fretfulness, aggravated by feeding, perhaps with failure to gain during the first weeks of life; (*b*) projectile vomiting, diarrhea or constipation, with or without visible gastric or intestinal peristalsis; (*c*) absence of tumor at the pylorus, and (*d*) ready response to atropin therapy. Tetany,

155. Griffith, J. P. Crozer: Final Report on a Case of Xanthoma Tuberosum with Diabetes Insipidus, Arch. Pediat. **40**:630 (Sept.) 1923.

156. De Lange, Cornelia: Some Aspects of Neuropathy in Infancy, Am. J. Dis. Child. **26**:83 (July) 1923.

157. White, P. J.: Gastro-Enterospasm as a Manifestation of Autonomic Imbalance in Early Infancy, Am. J. Dis. Child. **26**:91 (July) 1923.

protein sensitization, the exudative diathesis and parenteral infection may be associated etiologically with gastro-enterospasm. Atropin, properly given, is a specific for gastro-enterospasm of vagus origin.

Pototsky [158] would divide neuroses of childhood into: (1) neuropathies, (2) psychopathies, (3) hysteria. He omits Zappert's four additional groups, namely, habit neuroses, imitation neuroses, anxiety neuroses and compulsion neuroses. But both classifications, he says, group together many unequal and dissimilar factors.

Charles Street at Thirty-Fourth.

158. Pototsky, C.: The Constitution and Reactions of the Nervous Child, Ztschr. f. Kinderh. **37**:24, 1924.

POSTGRADUATE WORK IN PEDIATRICS

An opportunity has been arranged for extensive postgraduate work in pediatrics in New York City. This work is carried on at the Columbia University College of Physicians and Surgeons, and at the New York Postgraduate Medical School, with some graduate courses in Brooklyn and the opportunity for special internships in pediatrics.

Since these courses have the approval of the committee, consisting of Drs. Freeman, Charles H. Smith, and Schloss, we can be assured of their high standard. It is gratifying that this country is beginning to take up graduate work in a satisfactory manner, since the demand is great, especially in pediatrics.

Abstracts from Current Literature

Anatomy and Physiology

THE SPLEEN CONSIDERED IN ITS RELATION TO THE HEMOPOETIC FUNCTIONS. ALDO BOLAFFI, Arch. di Pathol. e Clin. Med. **4**:1, 1925.

The author has classified the present knowledge regarding the function of the spleen in its relation to the blood. The article contains a review of the literature on the spleen, supplemented by some personal observations of the author. The functions of the spleen are summarized as follows:

1. The spleen normally forms only mononuclear cells and perhaps platelets.

2. The spleen destroys the red blood cells, the white blood cells and the platelets. Pathologic destruction occurs in certain diseases, such as hemolytic jaundice, pernicious anemia and purpura hemorrhagica.

3. In intra-uterine life, the spleen has myelopoetic and erythropoetic functions. After birth in certain pathologic conditions, these functions also are present.

4. The spleen regulates the iron metabolism.

5. In splenic anemia and Banti's disease, the spleen seems to cause the anemia.

6. The spleen seems to form a hormone which regulates the activity of the bone marrow.

HIGGINS, Cincinnati.

PHYSIOLOGY AND PATHOLOGY OF BONE GROWTH. H. MAASS, Med. Klin. **20**: 1532, 1924.

Maass states that the pathologic lesions in the bones of rachitic patients are not due to vegetative bone growth disturbance, but that they are rather due to a mechanical disturbance. The lesion is the result of a dynamic pressure disturbance of the spongy bone tissue.

PETERMAN, Rochester, Minn.

Pathology, Bacteriology and Biochemistry

THE EFFECT OF ADDITIONS OF FLUORIN TO THE DIET OF THE RAT ON THE QUALITY OF THE TEETH. E. V. MCCOLLUM, NINA SIMMONDS and J. ERNESTINE BACKER, J. Biol. Chem. **63**:553, 1925.

A review of the literature showed that fluorin has been found in all the tissues of the body, its highest incidence being in the teeth (about 0.3 per cent.) and in the bones (about 0.2 per cent.). When sodium fluorid has been fed to an animal, an equivalent amount was excreted in the urine and feces.

The authors have investigated the effect of the ingestion of fluorid on the development and health of the teeth.

Two groups of about 15 rats each were used. Each group received the same ration satisfactory for growth, except that to the diet of one group was added 0.02 per cent. sodium fluorid. The control animals developed essentially perfect

teeth, while those receiving the fluorin showed marked changes in dental development. There were changes in the color and polish of the teeth. The mandibular incisors showed extreme friability which resulted in erosion. The maxillary incisors showed marked overgrowth with curvature probably due to failure of occlusion of incisors.

Thus a small excess of fluorid over that normally in the diet caused definite retrograde action on the teeth. The over-ingestion of certain elements may have as distinct an influence on bone or teeth structure as a deficiency in the diet.

HIGGINS, Cincinnati.

THE DIAZO REACTION IN URINE. GEORGE HUNTER, Biochem. J. **19**:25, 1925.

The Ehrlich diazo reaction in acid solution, used to distinguish different types of jaundice, is specific for bilirubin. The diazo reaction in alkaline solution has been divided into two types, A and B. Type A reaction is characterized by gradual development of color until a stable maximum is reached. Type B is characterized by immediate development and rapid disappearance of the color. All urines give Type A reaction. The substances in urine responsible for it are iminazols, phenols, purins and chromogens. Type B reaction is given only by pathologic urines especially those from typhoid or measles.

A POSSIBLE CORRELATION BETWEEN DIETARY PROTEIN AND LOSS OF FUR IN YOUNG GROWING RATS. GLADYS A. HARTWELL, Biochem. J. **19**:75, 1925.

The loss of fur in a young growing rat is closely correlated with the quality or quantity, or both, of the dietary proteins. It can be remedied by adding more or better protein to the diet. A loss of fur was obtained when potato or white bread was used as sole source of protein. Addition of gluten, gelatin or casein to the bread diet prevents loss of fur. Brown bread or oatmeal as sole source of protein resulted in no loss of hair.

THE INFLUENCE UPON THE YOUNG OF AN EXCESSIVE AMOUNT OF CALCIUM IN THE MOTHERS' DIET DURING PREGNANCY. V. KORENCHEVSKY and MARJORIE CARR, Biochem. J. **19**:112, 1925.

When the mothers' normal diet during pregnancy was enriched with cod liver oil and an excess of calcium, there was a marked decrease in the disorders of nutrition and in the rachitic changes in the skeleton, produced in the young by a diet deficient in fat-soluble factor, even when the mother was also kept on the same insufficient diet during lactation. This effect was not produced when the mothers' normal diet during pregnancy contained butter as the only source of fat-soluble factor and was enriched by an excess of calcium.

KUGELMASS, New Haven, Conn.

SOLITARY NONPARASITIC CYSTS OF THE LIVER. R. C. ALEXANDER, Edinburgh M. J. **32**:61 (Feb.) 1925.

Swelling of the abdomen and constipation had been present since the age of 1 year in the 11-year old boy reported. Percussion revealed dulness continous with the liver from the third interspace to the pubes, the left hypochondrium alone being tympanitic. The heart apex was raised from the fourth to the third interspace on recumbency, but with no dyspnea. Tuberculous ascites seemed probable. At abdominal operation a large cyst consisting of one large and four small cavities was drained, the fluid in the one was green and

thick, in the others it was brown, clear and viscid. The cyst originated from the liver to the right of the gallbladder, and examination showed it to belong to the solitary nonparastic, multilocular type, congenital in origin probably from the primitive fore intestine.

The writer cites cases from the literature, two others in children aged 11 years, and mentions the variable age (from 4 months to 75 years) at which it may occur. This disease is rare, and has a different etiology from polycystic disease. His patient, in common with others having large cavities, died from shock.

NEFF, Kansas City, Mo.

FURTHER NOTES ON MODIFICATION OF DIPHTHERIA TOXIN BY FORMALDEHYD. A. T. GLENNY, BARBARA E. HOPKINS and C. G. POPE, J. Pathol. & Bacteriol. **27**:261, 1924.

Toxin is modified by the action of formaldehyd so as to reduce its specific toxicity without changing its combining power with antitoxin. The authors show by comparative studies in guinea-pigs that the formaldehyd modified toxin is a more powerful antigen than the toxin antitoxin mixtures. This modified toxin can be further concentrated. With this concentrated formaldehyd treated toxin, they were able to render eleven out of thirteen guinea-pigs negative to the Schick test in sixteen days. In rabbits, detectable amounts of antitoxin were found in the blood in nine days.

CHANGES IN THE CULTURE MEDIUM DURING THE GROWTH OF B. DIPHTHERIAE. A. F. WATSON and U. WALLACE, J. Pathol. & Bacteriol. **27**:271, 1924.

There is a definite relationship between the amount of bacterial bodies and toxin present in mediums. This toxin is precipitable by glacial acetic acid and is complete at a p_H of 3 to 4 and is soluble again in alkalinization to p_H 8.4. Room temperature has a very definite deteriorating effect on toxin in alkaline solution. The precipitate produced by acetic acid to culture filtrates is intimately associated with the toxin.

THE CONCENTRATION OF DIPHTHERIA TOXIN BY ACID PRECIPITATION. A. F. WATSON and U. WALLACE, J. Pathol. & Bacteriol. **27**:289, 1924.

The method consists in the precipitation of the nitrogenous material by glacial acetic acid from the culture mediums cooled to zero. After centrifugation, this was taken up in water and dilute alkali and the p_H adjusted to 8.4. A medium prepared by tryptic digestion of horse muscle is the best one for toxin production. This concentrated pure toxin is of value in the study of its essential nature and reaction.

HELMHOLZ, Rochester, Minn.

THE ACTION OF OXALATES AND OF CITRATES ON CIRCULATING BLOOD. J. W. PICKERING and J. A. HEWITT, J. Physiol. **59**:455, 1925.

Blood oxalated and recalcified in vivo behaves similary to blood so treated in vitro. Thrombosis arising from intravascular injection of calcium chlorid into the circulating oxalated blood of pithed cats is not due to the formation of crystals of calcium oxalate in the plasma. Intravascular injection of small amounts of sodium citrate into the cat produces hypercoagulability; large amounts produce temporary inhibition of clotting and blood shed during the inhibitory phase remains fluid for several hours. Recalcification of citrated blood in vivo does not cause thrombosis in the cat but may induce intravascular

clotting in the rabbit. Deductions from recalcification of plasmas oxalated or citrated in vitro do not apply to circulating blood.

THE INFLUENCE OF THE VAGUS ON THE ISLETS OF LANGERHANS. I. VAGUS HYPOGLYCEMIA. G. A. CLARK, J. Physiol. **59**:466-471, 1925.

In the rabbit, drugs which stimulate the parasympathetic system cause a lowering of blood sugar. This effect is not produced after section of the right vagus in the great majority of rabbits; it may be prevented in some animals by section of the left vagus. These results suggest that stimulation of the vagus causes a secretion of insulin.

KUGELMASS, New Haven, Conn.

CEREBROSPINAL FLUID PLEOCYTOSIS AFTER INJECTION OF RINGER'S SOLUTION. MADER and S. SAENGER, Klin. Wchnschr. **4**:213, 1924.

These observers found that the injection of 1 c.c. physiologic Ringer's solution into the cerebrospinal canal produced a lymphocytic cell increase after two or three hours. Several hours later, the polymorphonuclears predominated. Synchronous with the change in the cell picture, there was slight fever, but no meningeal symptoms. After from twenty-four to forty-eight hours, the fluid was normal.

SCHWARZ, Milwaukee.

CONCERNING AMMONIA PRODUCTION IN INFANTS. M. LANDSBURGER, Monatschr. f. Kinderh. **29**:559, 1925.

Landsburger shows that the production of ammonia in the infant is not so much due to the fat in the diet as it is to the reaction of the infant's intestinal contents. If this is acid, as is the usual finding in the breast fed infant, ammonia is produced. If the intestinal content is alkaline no ammonia is needed. The whole process can be explained by the absorption of acids from the intestinal tract and the resulting production of ammonia for their neutralization.

OBSERVATIONS ON THE PRODUCTION OF AMINS IN THE INFANT'S INTESTINE. ERICH ROMINGER and HUGO MEYER, Monatschr. f. Kinderh. **29**:569, 1925.

These two investigators showed that the amount of amin found in the infant's stool depends on the protein of the diet. Thus, it is always present on a diet of cow's milk and only infrequent on breast feedings. If, however, breast milk is treated so as to make the protein less digestible, then amins appear in the stool of the breast fed. The fact that amins are found invariably in the stool of the artificially fed baby proves conclusively that a toxic condition such as alimentary intoxication is not due to the production of amins per se.

THE BLOOD-PLATELETS IN INFECTION. BECK, Monatschr. f. Kinderh. **29**:673, 1925.

A previous study of the metabolism of a child with fever directed the attention of the writer to changes in the blood platelets. As profound changes in metabolism were noted even in the incubation period, so he thought that a corresponding change in the blood platelets might also occur during this period. Previous investigations have been inconclusive.

The method used was the old technic of Fonio which proved most satisfactory. Beck's tables show that the blood platelet count varies greatly in different children. In infections they do show a constant change, however. During the incubation of measles, on the fifth or sixth day, they show a decided increase. During the incubation of other infections also, about two to three days before the beginning of the fever, there is a marked increase. Then the number drops to subnormal, and as the temperature comes down the platelet-curve gradually rises to normal again.

THE ARNETH-SCHILLING DEVIATION OF THE NEUTROPHILS IN CHILDREN'S PRACTICE. J. SCHMID, Monatschr. f. Kinderh. **29**:681, 1925.

In eighty-six examinations of premature infants and children from the point of view of the Arneth-Schilling curves, Schmid came to the following conclusions:

1. In the premature infant and young nursling, the lability of the leukocyte count is so great that only great variations are of value.

2. In older children, both in infections with leukocytosis or with leukopenia, the variations closely resemble the adult type.

The method can be used practically in children as well as in adults. An increasing of the deviation to the left means increasing severity of the illness, and a diminishing deviation means improvement.

GERSTLEY, Chicago.

STUDY OF THE CARDIAC ANOMALIES. HANS SCHLENSING, Virchows Arch. f. path. Anat. **254**:579, 1925.

The author reports nine instances of congenital heart anomalies correlating pathologic findings with morphologic development of that organ.

CORONARY ARTERIOSCLEROSIS IN CHILD. C. BENDA, Virchows Arch. f. path. Anat. **254**:600, 1925.

Report of a case in a child, aged 12 years. This was evidently a birth anomaly, as the kidneys had undergone fibrotic change. Rupture of the heart muscle caused death.

SCHWARZ, Milwaukee.

A CASE OF EXCESS FORMATION OF THE TRACHEOBRONCHIAL TREE. HASSLINGER, Ztschr. f. Hals-, Nasen-u. Ohrenh. **9**:460 (Jan. 20) 1925.

Hasslinger adds another case which he observed in Hajek's clinic to the literature. The bronchoscope showed two entrances at the lateral wall at the right main bronchus. Pliable probes with roentgen-ray examination proved that an extra bronchus and not a diverticulum was present. Through necropsy findings it is known that an accessory bronchus can stand in various relations to the lung. Mueller and Herxheimer have described cases in which the accessory bronchus provided for an accessory lung which was separated from the other lung. In Chiari's cases it participated in the apical parts of the upper lobe.

AMBERG, Detroit.

Nutrition

CRANIAL RICKETS. HENRY E. UTTER, Boston. M. & S. J. **192**:602 (March) 1925.

Signs noted were: Craniotabes, softening along suture lines, lateral flattening of cranium (so-called "oblique head") cranial resonance, and size of fontanel. Of 192 cases studied, craniotabes appeared in 155; these, 102 cases

occurred in about equal numbers (thirty-four, thirty-three and thirty-five), in the third, fourth and fifth months; as a check, 100 new-born infants, including five premature babies, were studied, but none showed craniotabes.

Of the 155 cases of craniotabes seventy-four were tested with the galvanic electric current for reactions suggestive of latent tetany and thirty-three showed such reactions, twenty-eight of these occurred in the tetany season, from January to April, inclusive. Cranial resonance was elicited similar to MacEwen's sign; it apparently increases when tetany supervenes on rickets and rapidly decreases with the administration of large doses of cod liver oil and phosphorus.

Finding many discrepancies in the general observation that a large anterior fontanel is found in rickets, the author measured the fontanel in fifty new-born babies and found they ranged from 1 to 3 cm. in the oblique diameter. Only 25 per cent. of the 192 cases showed beading of the ribs. The author considers craniotabes the most valuable early sign of rickets. The ages of the children studied were not given but apparently all were under 1 year.

GENGENBACH, Denver.

IRRADIATED FOODS AND IRRADIATED ORGANIC COMPOUNDS. HARRY STEENBOCK and AMY L. DANIELS, J. A. M. A. **84**:1093 (April 11) 1925.

The fact that such different agents as light and cod liver oil should have the same effect on rickets has made it incumbent on the research worker to supply the explanation, or else admit that little is known about the etiology of the disease. The authors noticed that when irradiated and nonirradiated rats on a rachitic diet were put together, all grew alike as a rule. This finding suggested that it might be possible to transmit this antirachitic factor by irradiated food and organic compounds. They found that by exposing such materials as wheat, rolled oats, corn, hominy, cream of wheat, shredded wheat biscuits, corn flakes, patent wheat flour, cornstarch, meat, milk, egg yolk to ultraviolet light they could be endowed with rickets preventing properties. That such a wide variety of foods can be thus affected appears to be due to the fact that practically all naturally occurring foods contain lipoid constituents of the nature of sterols which can carry this actuation. Cholesterol, for example, as obtained from bran is entirely inactive, but after exposure to ultraviolet light becomes rickets preventing. As fats are good solvents for these lipoids, practically all fresh fats such as butter fat, olive oil, lard, corn oil, cocoanut oil, cottonseed oil can be activated often to a degree to make them compare favorably with cod liver oil. As antirachitic action consists in the induction of calcium assimilation and its conservation for the animal, this is a matter which concerns not only the young but also the adult. It is suggested that these findings may have their significance not only in nutrition, but also in the therapy of those diseases known to respond to irradiation with ultraviolet light.

CEREAL GRUEL FEEDING. OSCAR E. CHASE, J. A. M. A. **84**:1173 (April 18) 1925.

Fifty difficult feeding cases, in which cereal gruel feedings were given after from two to six weeks on various other feedings with no gain in weight, a loss or a very poor gain in the majority, are reported on by the author. With but four exceptions, no starch was found in the stools, and those exceptions showed 0.11, 0.025, 0.15 and 0.43 gm. The stock formula was whole milk to the amount of 100 c.c. per kilogram of body weight, with an equal amount of water before 6 months, and 16 gm. of farina, with the farina gradually increased to 48 gm. up to 6 or 7 months. This was all cooked together in

a single boiler for fifteen or thirty minutes. The evaporation loss was made up after cooking by the addition of water to the amount required, after which from 20 to 32 gm. of sucrose was added, or 48 to 80 gm. of dextrimaltose, and the whole amount divided into five bottles for the day's feedings at four hour intervals. The milk and cereal were increased as the weight advanced, the milk after five or six months gradually replacing the water, until at 11 or 12 months, whole milk was given. This milk cereal and water mixture was thin enough to be taken through the ordinary rubber nipple, with perhaps some increase in the nipple opening and there was an equal amount of cereal in all the feedings. In most instances, farina was used, but when constipation was present, oatmeal was used, at least part of the time. There was no age limit and the cereal was used with premature infants and from 1 month of age. The infants of this series gained uniformly and improvement of nutritional and general development was noted. As a routine measure, phosphorized cod liver oil and orange juice or raw tomato juice were given. In spite of reduction of the cooking time for starches, complete digestion occurred in practically all instances.

Effects of Radiations of Cod Liver Oil. O. A. Manville, J. A. M. A. **84**: 1401 (May 9) 1925.

The experiments of the author seem to verify the assumption that the reason rats failed to develop infections when raised on diets containing fat soluble vitamin (cod liver oil) was the bactericidal action of the ultraviolet radiations that are now known to characterize such fats. Besides the action of cod liver oil in curing or preventing rickets, the author is led to conclude that there are two other specific actions: (*a*) There is a stimulation of cell activity and a distinct inhibitory effect on bacterial growth; (*b*) when these active substances are in excess there is exerted a depressing action, the most striking of which is a lack of fertility.

Bonar, Salt Lake City.

Blood Calcium and Inorganic Phosphates in Children with Marked Lack of Muscle Tone. Lucy Wills, Brit. M. J. **1**:302,1925.

This author studied the calcium and phosphorus content of the blood serum in Patterson's series of hypotonic children. The methods employed were those of Kramer and Tisdall for calcium, and Brigg's modification of the Doisy method for inorganic phosphates in the plasma.

In general, the chemical findings did not support the hypothesis that muscle hypotonus in children is necessarily an indication of some degree of rickets, although the calcium variation was somewhat the same in both conditions. In the hypotonic children there was little variation from the normal.

Irradiation of Milk and the Healing of Rickets. S. J. Cowell, Brit. M. J. **1**:594, 1925.

This observer placed three definitely rachitic children (confirmed by roentgen ray) on a diet not conducive to healing rickets, and containing only 1 pint of milk (winter milk) which was considered the only source of antirachitic substance. The milk destined for two of the children was exposed to the rays of mercury vapor lamp of the Hanot type before it was given to them while the third child received untreated milk. The irradiation was carried out twice a day by exposing the milk in a shallow dish at a distance of 3 feet for thirty

minutes. At the expiration of one month, the roentgenogram of the wrists of the children along with the control showed a decided increase in the calcification in those who were treated with the irradiated milk.

BROWN, Toronto.

Prenatal Conditions

CONTRIBUTION TO THE ETIOLOGY OF SPRENGEL'S DISEASE (CONGENITAL ELEVATION OF THE SCAPULA). MILOSLAV HAVRANEK, Casop. lek. Cesk. **63**:1125 (July) 1924.

A review of the theories cited includes primary embryonic malformation; increased intra-uterine pressure in the presence of insufficient amniotic fluid; traction of amniotic folds on the shoulder girdle; adhesions produced between the exostoses and other deformities of the scapulae and the vertebrae; dislocation due to atonic muscle; intra-uterine poliomyelitis; atavism and failure of the scapulae to descend in the fetal stage. Of the cases cited one had an associated upper spine scoliosis and massive cohesion of the upper four thoracic vertebrae, and lateral rotation of the lower cervical vertebrae with the consequent deformity of the ribs.

STULIK, Chicago.

Diseases of the New-Born

INTRACRANIAL HEMORRHAGE IN THE NEW-BORN. WILLIAM SHARPE and A. S. MACLAIRE, Am. J. Obst. & Gynec. **9**:452, 1925.

The definite association of evidence of old organized intracranial hemorrhage and cerebral spastic paralysis led the authors to a study of the spinal fluid of 400 consecutive new-born infants.

They conclude that intracranial hemorrhage and cerebral edema occur rather frequently and many pass undiagnosed, and suggest that early lumbar puncture should be employed in suspected cases not only for diagnosis, but as a therapeutic measure. If evidence of hemorrhage is found, the puncture should be repeated every twelve to twenty-four hours until clear fluid is obtained. In premature babies or those with low vitality and in a state of shock, puncture should not be done until the general condition improves.

Muscular twitches of fingers, extremities, face and orbits are very suggestive as signs of increased cerebral irritability due to subcortical hemorrhage and should not be neglected, as signs in the new-born are meager unless the hemorrhage is of large amount. Early, correctly applied low forceps cause less hemorrhage than the prolongation of labor, with its attendant intracranial venous stasis. Hemorrhagic disease of the new-born does not seem to be an important etiologic factor.

ALLEN, Chicago.

HEMORRHAGIC DISEASE OF THE NEW-BORN. LAWRENCE T. ROYSTER, Virginia M. Month. **51**:693 (Feb.) 1925.

The author discusses briefly the question of hemorrhage of the new-born. He would divide these cases into two classes: (1) Those due to trauma of the head and consequent laceration of the intracranial sinuses, and (2) spontaneous hemorrhage of the new-born. It is with the latter class that the paper deals. The author discusses the symptomatology of intracranial hemorrhage of the new-born in particular, and urges the routine taking of the clotting time of the infants' blood and the subcutaneous injection of whole blood when the clotting time is greater than ten minutes. The author bases his treatment on the recent work of Rodda, in which it was shown that a large proportion

of cases showing intracranial hemorrhage had a delayed clotting time some time within the first ten days of life. It is the author's custom to take the clotting time of all new-born infants a few hours after birth and again on the third or fourth day. If the clotting time is above ten minutes he would inject whole blood subcutaneously, repeating the injections if necessary. The writer gives the Rodda technic in detail. He makes a plea for the above-mentioned procedure and feels that if it were adopted by those having to do with new-born babies, many lives would be saved and society spared a definite number of feeble-minded cripples.

WADDELL, University, Virginia.

ARTHRITIS AND GONORRHEAL BURSITIS IN A SEVEN DAY OLD CHILD. HANS KNAUER, Monatschr. f. Kinderh. **29**:725, 1925.

Knauer reports a case of gonorrheal infection of one of the toe joints and of the prepatellar bursa in an infant, aged 7 days.

GERSTLEY, Chicago.

Acute Infections

THE TREATMENT OF DIPHTHERIA CARRIERS BY ROENTGEN RADIATION. DALTON KAHN, Am. J. Roentgenol. **12**:343 (Oct.) 1924.

Local antiseptics are capable of 60 per cent. cures, tonsillectomy 80 per cent. and roentgen radiation offers the possibility of 100 per cent. cure. No bactericidal action is claimed, but the tissues become an unsuitable soil for the propagation of bacteria.

Of 185 patients treated, 152 remained free of virulent diphtheria organisms as determined by reculture after an interval of ninety days. In a second series of twenty-three, a negative culture was obtained in all after a slightly longer exposure. The patients of this second series were treated with a broad focus Coolidge tube, 10 inch focal skin distance, 7 inch spark gap, 5 ma., filtered through 3 mm. aluminum, time, four minutes, with both tonsil areas and postnasal space treated at each sitting.

STULIK, Chicago.

OBSERVATIONS ON THE ADMINISTRATION OF DOCHEZ'S ANTISCARLATINAL SERUM (SCARLATINAL ANTITOXIN) INTRAVENOUSLY. A PRELIMINARY REPORT. C. L. THENEBE, Boston M. & S. J. **192**:939 (May) 1925.

The serum was used in twenty-two patients. First case reported was an adult, aged 26, who showed extreme toxemia, received 40 c.c. of serum intramuscularly on the fourth day; death occurred on the fifth day. In twenty-one cases the serum was given intravenously. One case, a child, aged 2 years, admitted on the seventh day with a temperature of 106 F. and extreme toxemia, was given 10 c.c., with death occurring in twelve hours. One adult, aged 43, with a temperature of 103.4 F. and extreme toxemia, was given 57 c.c. on the third day; death occurred on the fifth day. All the other patients recovered, as did eighteen with only mild or moderate toxemia who received no serum. Nine were over 20 years and thirty-one between 2 and 20 years. Most of them received from 10 to 20 c.c. intravenously; of these, five cases were mild, seven moderate, six severe and four extreme; one of the latter patients who recovered after receiving 150 c.c. on the seventh day, had streptococcic bacteremia, nephritis and ethmoidal sinusitis. Two patients complained of chilly sensations as a result of injections, and four developed serum rash.

GENGENBACH, Denver.

Effect of Pertussis on the Heart. Paul V. Ledbetter and Paul D. White, J. A. M. A. **84**:1022 (April 4) 1925.

Study of 237 cases of whooping cough led the authors to conclude that there is no proof of endocardial or myocardial damage during the course of the disease or afterward. Circulatory failure does not seem to occur during pertussis, though the paroxysms of whooping cough undoubtedly do produce a temporary mechanical strain, particularly on the right side of the heart. No evidence of damage to the heart in any case, as a result of whooping cough, could be found in these 237 cases, although one child had chronic endocarditis and one congenital heart diseases before infection.

Intradermal Salt Solution Test in Lobar Pneumonia in Children. Jeanette Harrison, J. A. M. A. **84**:1258 (April 25) 1925.

The author undertook to determine whether in lobar pneumonia the intradermal salt solution test would show changes in the skin indicative of a tendency to edema and of tissue intoxication, and incidentally to determine what effect, if any, fever has on the tissue's avidity for water. The technic described by McClure and Aldrich was followed in twelve patients, ranging in age from 2 to 14 years. In lobar pneumonia in children, it was concluded that there is a considerable shortening of the disappearance time of intradermally injected salt solution. The crisis has no immediate effect on the length of the disappearance time. After the crisis, the return to a normal disappearance time is usually slow. It is suggested that this effect on the disappearance time indicates an intoxication of the tissues, which is more persistent than is ordinarily considered to be the case.

Bonar, Salt Lake City.

Scarlet Fever and Public Health. W. C. Rucker, South. M. J. **18**:239, 1925.

Judged on the basis of statistics scarlet fever does not seem to be a major health menace. These are, however, deceiving. The disease is more widespread than any available statistics indicate.

At lease 90 per cent. of the cases of scarlet fever occur before the tenth year and most of the deaths are in children under 6 years.

Under present conditions, the treatment and isolation of scarlet fever cases results in heavy community losses. The present method of quarantine involves, on an average, a fifty day loss to the patient, his family and attendants. It does not recognize the fact that immune persons rarely spread scarlet fever.

Scarlet fever is essentially a disease of children less than 10 years of age. Infants seem to be relatively immune.

It is not generally a disease of adults. The author believes that the bulk of the population acquires an immunity to the disease before reaching adult life.

The scales are probably not infectious and do not act as agents in spreading the disease. All pathologic discharges, however, are infectious.

The author believes that every severe sore throat should be considered as suggestive of scarlet fever and treated accordingly.

To quarantine wage earners and adults of the family is hardly justifiable now that we have a method whereby we can differentiate accurately between immune persons and those who are nonimmune. It is hardly probable that immune persons will act as agents, and to quarantine them is therefore not logical.

To interefere with the schooling of an immune child because of the presence of scarlet fever in his home is not justified.

By means of the Dick test it is possible to determine the nonimmune persons and to immunize them. Children should be immunized against scarlet fever.

The author is not convinced that scarlet fever carriers exist and believes that it is the missed case that keeps the disease alive.

The disease is universal in its distribution but is less serious and less frequent in the tropics.

In a way, the scarlet fever curve seems to follow the time when schools are in session. The disease is spread by promiscuity, overcrowding, and direct and indirect contact. Ingestion of the organism in milk, for example, may be another means of infection. The chief carriers are missed cases. The chief portal of exit of the causal agent is through the mouth and nostrils—not through the skin. The period of infectiousness is still the subject of wide debate.

SCHLUTZ, Minneapolis.

PREVENTION AND CONTROL OF SCARLET FEVER. L. M. FIELD, Wisconsin M. J. **23**:621, 1925.

A short historical sketch of scarlet fever is given and the work of George and Gladys Dick is briefly reviewed. At the present time, prevention and control of scarlet fever is limited to quarantine of the patient and isolation of contacts. The mild cases of the disease are obscure and their diagnosis is difficult, hence they are often "missed" and become a source of infection to the community.

It has been demonstrated that the hemolytic streptococcus, the type which causes scarlet fever, is often found in open skin lesions when no other symptoms of the disease are present.

The author states that he has observed many cases in which the patient with the infected wound never developed scarlet fever but another child in the family would become ill with the disease, and gives as his opinion that the child who had the infected wound in all probability developed immunity and was capable of transmitting the disease without actually having had scarlet fever.

There is strong evidence that there are healthy carriers of the disease. Another source of infection undoubtedly is the discharged patients who become carriers.

In view of these facts, the prevention of scarlet fever may be seen to be next to impossible and control difficult. There is great hope at present that we will have a much improved and more efficient means of control as the result of the work of the Dicks.

It is not known how long the immunity produced by the Dick antitoxin will last. It is known to last for one year and will probably last for life. The new-born are practically immune to scarlet fever but the susceptibility increases to the twentieth year, when it decreases, as evidenced by the Dick test. To make scarlet fever entirely preventable, a cultural method simple enough to be used by the practicing physician for culturing the throat and discharges of patients and contact before they are released from quarantine must be devised. The author has been informed by the Dicks that this can be accomplished, although the culture medium necessary is more difficult to handle than Loeffler's blood serum.

Until these new agents and procedures are available, it will be necessary to make use of the old methods of control.

The importance of school inspections and the visiting of absentees is stressed. Schools should almost never be closed, for in them we have the best chance to inspect and discover cases.

KASTNER, Milwaukee.

RHEUMATIC INFECTION IN CHILHOOD. THE SUBCUTANEOUS FIBROID NODULE AS AN EARLY MANIFESTATION. VINCENT COATES, Brit. M. J. **1**:550, 1925.

Sir Thomas Barlow considered subcutaneous nodules "in themselves indicative of rheumatism, even in the absence of pain and, although unimportant, they are nevertheless of serious import." Bronson and Carr state "that the nodules are a sign of some active rheumatic focus and that they tend to disappear as the infection becomes quiescent."

However, arguing on analogy with the findings in adults suffering from fibrositis, it did not seem improbable to the author that nodules less obvious than these of graver infection might be discovered in subacute cases. In searching for the nodules, particular attention was paid to the spinous processes of the vertebrae and to the olecranon process. One hundred consecutive outpatients were studied, who varied from 2 to 12 years of age, irrespective of their complaints. Twenty-three patients gave a history suggesting rheumatism and in eighteen rheumatic nodules were found. Microscopic examination of nodules from two showed that the etiology of the nodule may be associated with a persistent irritant of the subinfective or mildly infective type.

BROWN, Toronto.

DURATION OF INCUBATION PERIOD OF WHOOPING COUGH. C. FUNCK-HELLET, Arch. de méd. d. enf. **28**:94 (Feb.) 1925.

Observations made under well controlled conditions in a home for children during seven epidemics of whooping cough have led the author to conclude that the miniminum incubation period is from nine to eleven days. Bacteriologic examination of the sputum is an extremely valuable diagnostic measure in the hands of one well trained in this work. Systematically applied, it would permit the injection of serum during the early days of the incubation period of the disease. The convalescent serum of Debré has given good results when injected during the incubation period. A central station for examining cultures would facilitate the early use of serum or vaccine, and thus greatly lower the incidence and the mortality of whooping cough or its sequellae.

BONAR, Salt Lake City.

SUSCEPTIBILITY AND IMMUNITY TO SCARLET FEVER. THE INTRADERMAL TEST WITH THE STREPTOCOCCUS TOXIN OF DICK. C. ZOELLER, Bull. et mém. Soc. méd. d. hôp. de Paris, 1696, 1924.

The author reports the results of the injection of diluted streptococcus toxin (Dick test) in a series of adult patients, using toxin which he has prepared himself together with toxin supplied him from America by Dick and by Zingher. He found thirty-eight positive reactions in a series of 125. One patient who was developing scarlet fever on admission, gave a positive reaction which eight days later became negative. Injection of antistreptococcic serum, the source of which is not mentioned, in two cases of erysipelas did not prevent the development of a positive Dick test. The second part of the paper deals with neutralization of the toxin by serum of patients who have a negative Dick test. The result is to confirm the observation of Dick and Zingher,

that the serum of a subject whose Dick test is negative when mixed with the diluted toxin prevents the development of a positive test in a susceptible subject. Lastly, the pseudoreaction is described and discussed. This paper is of the nature of a preliminary report as it merely repeats and confirms the reported work of Dick and Zingher.

JOSEPHS, Baltimore.

VACCINATION BY THE NASAL ROUTE. G. SANARELLI, Ann. d'ig. **34**:861-881, 1924.

Following a long series of experiments in man and in animals, the author makes the following report:

1. By the inhalation of powdered vaccines through the nares, rabbits acquired in a short time an immunity against *Bacillus Typhosus, Cholera Vibrion, Bacillus dysentericus* and the meningococcus.

2. The immunity thus obtained was demonstrated not only by the agglutination phenomenon in the blood serum of the animals, but also by their resistance to infection by lethal doses of the virulent organisms.

3. The agglutination reaction obtained in animals nasally vaccinated against typhoid was of longer duration than when subcutaneous vaccination was done.

4. In man, antityphoid vaccination through the nasal mucous membrane also produced an agglutination reaction in the blood. The reactions in man, however, appeared more irregularly than when vaccinated subcutaneously.

5. Anticholera nasal vaccination in animals produced specific blood reaction as soon as but not as strong as did the typhoid. It was far superior to hypodermic vaccination.

6. Anticholera vaccination in man gave very inconstant results. The same can be said for the subcutaneous route.

7. The antidysentery vaccination in animals gave good results. They were able to resist large lethal doses of Shiga bacilli given subcutaneously.

8. In man, agglutination appeared slowly, and only effectively when antityphoid vaccination was done simultaneously.

9. In rabbits, antimeningococcic nasal vaccination produced a slow but strong reaction.

10. In man also, very satisfactory reactions were obtained, but over a month of continued aspirations of the vaccines was necessary.

THE DIAGNOSTIC VALUE OF THE BRAHMACHARI REACTION IN KALA-AZAR. GABRIELE ARENA, Clin. Pediat. **3**:161-169, 1925.

Brahmachari attributes great value to his test as a means of diagnosis in kala-azar. The test is a simple one to perform. Two volumes of distilled water are added to 1 volume of blood serum. At the point of contact a specific annular opacity forms. The zonal reaction may also be obtained by diluting the blood serum with from 10 to 20 volumes of physiologic sodium chlorid solution and the distilled water is then added drop by drop.

The chemical behavior of the precipitate formed is the same as that of the globulin substances.

Other observers state that the reaction is not specific since many known cases of the disease failed to give a positive response.

Dr. Arena applied the test to eighty-seven patients. Forty were known cases of leishmaniasis. He followed the original technic excepting that he obtained the blood from his patients after a twelve hour fast. Even with this modification, it was difficult to get a clear serum in all cases. He believed that the persistent cloudiness was due to a lipemic state peculiar to certain cases of kala-azar. His results were as follows:

1. In forty cases of kala-azar, the reaction was positive in thirty-one (77.5 per cent.).

2. In ten cases of splenic anemia with leukopenia, the reaction was positive in six (60 per cent.).

3. In eight cases of pseudoleukemia, the reaction was positive in two cases (25 per cent.).

4. In seven cases of malaria the reaction was positive in three (42.8 per cent.).

5. In twenty-two miscellaneous cases the reaction was positive in nine (40.9 per cent.). A comparison of the results with this test was made with those of the Wassermann test in syphilis. It follows that although there are many cases that do not give a positive Brahmachari test in kala-azar, the percentage is not as great as that obtained in syphilitics that give a negative Wassermann reaction. While the Brahmachari test is not absolutely diagnostic, nevertheless when it is positive, kala-azar must be the first thought.

Arena believes that a greater dilution of the serum would produce a more specific and more constant precipitate quite unlike that produced by other diseases under the same conditions. Considerable work is being done along such lines.

The classical Brahmachari reaction, as specific as it may be as a diagnostic procedure in kala-azar, can never replace the isolation of the Leishmann organism from the bone marrow and splenic pulp, as positively pathognomonic of this disease.

ZAMBARANO, Washington, D. C.

CLINICAL AND BACTERIAL STUDIES ON WHOOPING COUGH. EUGEN KRAMAR, Monatschr. f. Kinderh. **29**:697, 1925.

A large epidemic of whooping cough in Budapest gave the author the opportunity of making a number of interesting studies. With regard to the search for the Bordet-Gengou bacilli, instead of the usual culture medium, he found an agar mixture made up with testicular extract and human blood much more satisfactory. This medium has been previously recommended by Americans as being particularly favorable for the growth of these bacilli. Colonies become visible on the plates in eighteen hours, compared to a forty-eight hour period in the other medium. His vaccine was prepared from forty-eight hour cultures grown on this combination: 10 billion bacilli per cubic centimeter preserved with 0.5 per cent. phenol (carbolic acid). Dosage was 0.2, 0.4, 0.6 and 1 c.c., given at three day intervals.

Bordet-Gengou bacilli were found in fifty-two of sixty cases. In early cases, they were found almost in pure culture. Twenty controls of other febrile diseases were negative. Cultures were obtained by getting the patients to cough into the agar plates.

The author devotes several pages then to clinical studies on the value of the vaccine as a prophylactic. Of sixty-nine children injected, sixteen developed the disease, and fifty-three, under the same conditions remained uninfected.

As the contagiousness of whooping cough is 100 per cent., the author concludes that the value of the vaccine as a prophylactic is unquestionable although not infallible.

In the treatment of whooping cough, reports as to the value of vaccine have been conflicting. In this study, the writer believes that, following the inoculations, there was a decided improvement in symptomatology in ten to sixteen days. This improvement occurred in 86 per cent. of the cases.

Kramar concludes his article with one or two other observations of interest. Occasionally the incubation period of the disease seemed to last as long as eight weeks. In a few cases the disease started in acutely with fever and in its onset resembled the usual grippal infections so common in children.

GERSTLEY, Chicago.

Chronic Infections

ULCERATIVE PULMONARY TUBERCULOSIS IN INFANTS. HARRY L. FARMER, Am. J. Roentgenol. **12**:327 (Oct.) 1924.

Necropsy showed cavity formation in pulmonary tuberculosis in infants under 2 years in 31 per cent. of 250 cases. These were most common between 6 and 18 months. Occurrence under 3 months is extremely rare.

Cavitation cannot be found without the roentgenogram antemortem. The location in this period is removed from the apexes as a rule and is in the middle and lower lobe, more often on the right, and usually is unilateral. Colored infants are more susceptible. In the author's series of seven cases no hemoptysis was noted, although in three cases the cavity included a lobe or more. All the infants necropsied showed single cavities.

A roentgenogram of the chest of an infant with meningitis may disclose extensive pulmonary tuberculosis, usually miliary in type, and establish the type of meningitis.

The tuberculin skin test was positive in all cases. An early differential diagnosis between tuberculous bronchopneumonia and a nontuberculous lesion may be difficult. Cavitation is diagnostic of tuberculosis, and a widened mediastinal shadow and enlarged hilum shadows consistent with tuberculous adenitis favor the diagnosis of pulmonary tuberculosis.

STULIK, Chicago.

MERCUROSAL IN EXPERIMENTAL RABBIT SYPHILIS. O. M. GRUHZIT, Arch. Dermat. & Syph. **11**:509 (April) 1925.

Because of the multitude of antisyphilitic remedies being advocated, it is desirable to subject each remedy to thorough experimental study before using it for treatment of human syphilis. For this reason the author has submitted mercurosal to a trial in experimental rabbit syphilis. The efficacy was determined by inoculating macerated lymph glands from an affected and treated rabbit into the testes of another rabbit. The results are in conformity with quoted observations of Belding and Holmes, in which the Wassermann reaction was used as a criterion of effectiveness. The author's findings are as follows:

A single treatment of a syphilitic rabbit with a dose of from 10 to 15 mg. of mercurosal per kilogram of body weight produced a cure. A single treatment below 6.7 mg. per kilogram did not. When given at two to three day intervals, a dose of 3.3 mg. per kilogram produced a cure in 70 per cent. of the cases. No cure followed the use of 1.7 mg. per kilogram at two to

five day intervals for eight doses. Rabbits were freed from spirochetes in 7.5 days with an average of 2.9 treatments with a dose of from 3 to 3.3 mg. per kilogram. A dose of 5 mg. per kilogram freed the rabbits from spirochetes in four days with an average of 2.5 treatments. Repeated administration at two to three day intervals in doses of from 3 to 5 mg. per kilogram had no noticeable toxic effect on rabbits.

TRYPARSAMIDE IN THE TREATMENT OF NEUROSYPHILIS: A STUDY BASED ON OBSERVATION OF 152 PATIENTS FOR EIGHTEEN MONTHS. JOHN H. STOKES and LOUIS F. X. WILHELM, Arch. Dermat. & Syph. **11**:579 (May) 1925.

The authors summarize briefly the advantages and disadvantages of tryparsamide. The study includes cases of hereditary syphilis. They conclude that tryparsamide has a beneficial effect on neurosyphilis which has been resistant to other therapy, and is superior both clinically and serologically to standard methods of treatment in such cases. Because of possible eye complications, they regard tryparsamide as a last rather than a first resort in asymptomatic neurosyphilis.

THE EFFECT OF GLUCOSE ON THE STABILIZATION OF SOLUTIONS OF ARSPHENAMIN AND NEO-ARSPHENAMIN. JAY F. SCHAMBERG and ANNA M. RULE, Arch. Dermat. & Syph. **11**:658 (May) 1925.

The addition of 5 per cent. of glucose to solutions of arsphenamin retarded the development of increased toxicity for at least twenty-four hours. Glucose had no effect in retarding toxic changes in neo-arsphenamin.

JEANS, Iowa City.

BRONCHIAL GLAND TUBERCULOSIS. JOHN B. HAWES, 2d., and ELI FRIEDMAN, Boston M. & S. J. **129**:954 (May) 1925.

A study of 100 contact children admitted to the Prendergast Preventorium of Boston Tuberculosis Association, disclosed that all had a positive Pirquet test, a supposed roentgen-ray evidence of bronchial gland or hilum tuberculosis and had had all foci of infection removed, with the hope for gain in weight. Special points studied were roentgen-ray evidence, d'Espine's sign, parasternal and vertebral dulness, and Eustace-Smith sign. Interesting variations in interpretation of all these signs by different observers are brought out and tabulated.

CONCLUSIONS

Roentgen-ray evidence.—1. There is no apparent unanimity of opinion as to what constitutes normal or abnormal, tuberculous or nontuberculous, active or inactive, old or recent.

2. We believe that there is urgent need of further study as to the effect of acute nontuberculous respiratory tract infections on the hilum glands and tissues from both the clinical and roentgenologic aspects.

3. We are of the opinion that both the d'Espine's sign and the Eustace-Smith sign are of comparatively little value; further, we believe that so-called parasternal dulness is a point of no value and that paravertebral or interscapular dulness are of value chiefly in the hands of those very few whose skill in percussion is highly developed.

GENGENBACH, Denver.

STUDIES IN EXPERIMENTAL SYPHILIS. I. THE INFLUENCE OF THE SIZE OF INOCULUM ON THE COURSE OF EXPERIMENTAL SYPHILIS IN THE RABBIT. ALAN M. CHESNEY and JAROLD E. KEMP, J. Exper. Med. **41**:479, 1925.

Adult rabbits were inoculated in the body of the right testicle with testicular emulsion containing actively motile spirochetes of the Nichols strain, thus: six rabbits each received 0.8 c.c. of the emulsion, five rabbits 0.2 c.c. each, and six rabbits 0.05 c.c. each.

The average length of the incubation period for the different groups was in inverse ratio to the size of the dose of the infecting material. The authors gained the impression, that while it is possible by increasing the number of spirochetes inoculated in the testicle to speed up the initial reaction and render it more impressive by the occurrence of a massive scrotal edema, still the general picture of the disease is but little altered by varying the size of the inoculum within the limits used in this experiment.

The disease in one rabbit in the group receiving the smallest dose ran a particularly malignant course, illustrating the principle that malignant syphilis is the expression of an unusual degree of susceptibility of the host rather than an indication of exalted virulence or maximal amount of inoculum.

STUDIES IN EXPERIMENTAL SYPHILIS. II. THE INFLUENCE OF A NONSPECIFIC INFLAMMATORY REACTION ON THE DEVELOPMENT OF THE CHANCRE. ALAN M. CHESNEY and JAROLD E. KEMP, J. Exper. Med. **41**:487, 1925.

In each of five adult male rabbits, a circular area of skin on the back was excised under ether anesthesia exposing the subcutaneous tissues. No dressings or antiseptics were applied to the wounds. On the eleventh day following, six more rabbits were subjected to a similar operation. Forty-eight hours later the superficial crusts were carefully removed from the wounds in both groups and a drop of testicular emulsion, rich in actively motile spirochetes of the Nichols strain, was gently rubbed on each of the exposed areas. Thus granulating wounds thirteen days old and comparatively fresh wounds were compared concerning their behavior toward syphilitic infection.

In the group of thirteen-day old wounds the incident of positive inoculation results was 100 per cent. and in the forty-eight hour old group was 66.2 per cent. The incubation period was also distinctly shorter in the first group.

The authors state that the experiment seemed to indicate that a nonspecific inflammatory reaction favored the initiation of syphilitic infection and, further, that a granulating wound constitutes a somewhat more favorable site for the production of a characteristic chancre than does a comparatively fresh wound.

The experiment was repeated, using six rabbits in each group and in the first group allowing sixteen days to elapse before inoculating the wounds. The results were quite similar to those of the first experiment. There were 100 per cent. positive takes in the first group and 83.3 per cent. in the second group, with the appearance of syphilitic lesions again delayed in the forty-eight hour wounds.

The following experiments were also carried out: six groups of adult male rabbits were inoculated by gently spreading 0.05 c.c. of testicular emulsion rich in spirochetes on the lower dorsal and upper lumbar regions from which the hair had been clipped. The inoculations were made as follows: In Group A (four animals) on unbroken skin, in Group B (four rabbits) by subcutaneous injection, in Group C (four rabbits) in areas scarified with a razor as when

Thiersch grafts are cut, in Group D (seven rabbits) forty-eight hours after treatment of the skin with three applications of coal tar at forty-eight hour intervals, and after removal of the tar with resulting exposure of raw surfaces, in Group E (six rabbits) from one to two hours after excision of skin exposing subcutaneous tissue, and in Group F (six rabbits) as in Group E but with inoculation fourteen days after excision of the skin and after removing crusts. Ether anesthesia was employed in Groups C, E and F during the operative procedures, and in Group D, during the removal of the tar.

The animals were kept under observation for ninety days. In Group A no lesions developed, in Group B, 50 per cent. developed chancres (one other a general infection), in Group C, 100 per cent. developed chancres, in Group D, 100 per cent. had lesions, many multiple, in Group E, 100 per cent. developed lesions with average incubation period of thirty-six days, and in Group F, 100 per cent. had lesions with average incubation period of twenty-four days.

The authors state that their experiments would indicate that a nonspecific inflammatory reaction involving the skin and subcutaneous tissue favors the initiation and development of a primary syphilitic lesion in the rabbit. In advancing an hypothesis to account for this, they suggest the possibility that the same factors which bring about or contribute to active cell proliferation in a wound may also exert a favorable effect on the growth of the spirochetes.

McClure, Evanston, Ill.

Pulmonary Tuberculosis in Childhood. F. G. Chandler and T. W. Preston, Brit. J. Child. Dis. **22**:253 (Jan.-March) 1925.

The authors state that the frequency with which roentgenologists diagnose active tuberculosis at the hilum in cases where there is no clinical evidence of its existence is very rightly criticized. However, they believe that pulmonary tuberculosis does occur in infancy and childhood and that the more carefully it is looked for the more frequently it will be found. Absence of mortality does not imply absence of active infection.

Of 300 cases studied, eighty-nine were proved tuberculosis by finding tubercle bacilli in the sputum, by postmortem examination, or by both. The other 200 odd cases though not definitely proved, might nevertheless be early pulmonary tuberculosis or hilum tuberculosis.

The statement, frequently made, that if pulmonary tuberculosis occurs in children it is a rapidly fatal disease, is not entirely true.

Recognition of early tuberculosis:

1. Symptoms: Barking, dry, paroxysmal cough at night; evening fever, night sweats; loss of weight or failure to gain weight.

2. Signs: Parasternal or paravertebral dulness; narrowing of Kroenig's bands; D'Espine sign to fourth, fifth or sixth dorsal spine.

There may be retraction of the lower lung border; constant râles in any part of the chest and early signs of clubbing of the fingers.

The smallest particle of sputum is worth examining.

Roentgenograms help us little in establishing positively a diagnosis of tuberculosis of the mediastinal glands when we most need their help. There is far too great a tendency among many roentgenologists to stigmatize all hilum shadows and striations as pathologic and as tuberculous, nevertheless it must not be forgotten that thoracic tuberculosis is undoubtedly responsible for a great deal of chronic illness in infancy and childhood.

Of the eighty-nine cases of proved tuberculosis, sixty-one were females and twenty-eight males. Thirty-six cases were apparently unilateral phthisis, twenty-seven left sided and nine right sided. Thirty-five were improved as a result of treatment, twenty-seven died and the remainder were either unchanged or worse.

LANGMANN, New York.

STUDY OF TUBERCULOSIS IN CHILDHOOD BASED ON A REVIEW OF FORTY-TWO POST-MORTEM CASES. AGNES R. MACGREGOR, Edinburgh M. J. **32**:45 (Feb.) 1925.

From July, 1922, to December, 1924, 22 per cent. of 194 necropsies revealed tuberculous lesions, the age incidence from 4 months to 10 years being as follows: seven cases under 1 year, thirty-one between 1 and 5 years, and four over 5 years. Six cases had been unsuspected, nine patients died from other causes.

In this series, most cases of acute miliary tuberculosis and meningitis showed thoracic gland caseation. Caseation of cervical and mesenteric glands was less likely to be associated with miliary lesions and meningitis. Advanced caseous glands usually had pulmonary lesions associated, which seemed to be the source of miliary spread. Thoracic glands in one-third of the cases were involved earlier than the lungs, the lungs never showing an older infection than the glands. Generalized infection from the cervical glands is rare, especially when they are obviously enlarged and tuberculous. Tuberculosis of the tonsils is usually microscopic, and both the tonsils and the regional glands may pass the bacilli on to the thoracic glands. The writer believes that the infection may enter the blood stream before the formation of a focus and that the thoracic glands would probably be the site of the primary lesions. She supports the view that disablement of the pulmonary lymphatic system is preliminary to the development of lesions in the lungs and from the lungs to the general circulation. In young children extension by the blood stream is widespread and fatal, but frequently the extension is limited.

Caseous mesenteric glands may spread the disease to the abdomen but the condition seldom causes acute miliary tuberculosis. Nutritional and degenerative manifestations of tuberculosis from the toxins of the disease are less fatal in children, but are found more often and severe in abdominal infection. Intestinal ulcers in five and peritonitis in seven cases were found in the series. Tuberculosis of the mesenteric glands spreads by the lymphatics, in four cases through the diaphragm to the pleurae. Healed tubercles are rare in children. Meningtis was the cause of death in twenty-one of the forty-two patients.

NEFF, Kansas City, Mo.

THE QUESTION OF MULTIPLE PRIMARY INFECTIONS IN PULMONARY TUBERCULOUS INFECTION IN CHILDHOOD. A. GHON and H. KUDLICH, Med. Klin. **20**:1282, 1924.

A case of primary pulmonary tuberculosis was described in a patient, aged 3½ years. The child's history was known from birth, and hospitalization for stricture of the esophagus with subsequent treatments furnished a complete record, including Pirquet tests. The child died of meningitis and bronchitis following gastrostomy. Necropsy revealed seventeen apparently primary tuberculous lesions scattered throughout the lung. The lesions were of various stages but were all healed and calcified.

PETERMAN, Rochester, Minn.

Internal Diseases

ROENTGENOLOGIC EVIDENCE OF MITRAL DISEASE. JULIUS FERBER, Am. J. Roentgenol. **12**:321 (Oct.) 1924.

The mitral configuration in the dorsoventral projection gives an almost straight line triangle with rounded edges. The broadening of the heart at the base is very characteristic. The heart appears long, its left border has a stepladder arrangement, giving the impression of having been stretched. This is especially true in mitral stenosis and occurs even with atrophy of the left ventricle. As the ventricles dilate, the heart becomes enlarged in all its diameters and the transverse may even be larger than the longitudinal, a condition practically pathognomonic of mitral disease. The right border shows an elongated and bulging right auricular curve, which is also displaced upward, owing to right ventricular hypertrophy. The left border stepladder formation due to filling in of the constriction at the base is considered the characteristic feature.

Roentgen-ray examination has prognostic value by observation of the enlargement and dilation of the heart and observation of the effect of therapeutic measures.

Roentgen-ray examination is of value in differentiating between primary insufficiency, due to endocarditis of the mitral valve, and secondary insufficiency caused by myocarditis and dilation of the ventricles.

MULTIPLE MYELOMA WITH CASE REPORT. S. B. WHITLOCK, Am. J. Roentgenol. **12**:331 (Oct.) 1924.

Multiple myeloma is a specific malignant tumor of the bone marrow, probably arising from a single cell type and characterized by multiple foci of origin, a uniform and specific structure composed of plasma cells or their derivatives, rare metastases, albumosuria and an invariably fatal termination.

This condition has been interpreted as primary multiple sarcoma of bone marrow, senile osteomalacia, myelogenous pseudoleukemia and Kahler's disease.

The ribs, sternum and pelvis are the chief original seats of the tumors, but the long bones are frequently involved. The lesions are multiple and do not expand the cortex, but the gradual thinning and perforations allow pathologic fractures, which are usually painless.

Exposures to roentgen ray will produce a diminution of the size of the tumors with a collapse of the bony capsules.

OSTEOCHONDRITIS DEFORMANS JUVENILIS — LEGG'S DISEASE — WITH OSTEOMYELITIS OF THE ACETABULUM PROBABLY TUBERCULOUS. S. C. DAVIDSON, Am. J. Roentgenol. **12**:335 (Oct.) 1924.

In 1909, Legg of Boston, described an obscure condition of the hip joint, and Perthes, in 1910, differentiated and described the same condition. It appears in the young and presents a flattening and broadening of the epiphysis of the femur and is also styled osteochondral trophopathy of the hip joint. The condition is often mistaken for tuberculosis, as the age incidence, clinical signs and symptoms are closely akin to tuberculosis, but the disease does not react to tuberculin. The roentgenogram in typical cases is pathognomonic. The lesion apparently confines itself to the epiphysis and later may produce mechanical changes in the acetabulum through the action of the flattened and mushroomshaped head of the femur.

A boy, aged 8, with definite Legg's disease of the hip, reentered the hospital six months later with an osteomyelitis of the acetabulum. Acid fast bacilli were demonstrated. The presence of both conditions is probably coincidental and tuberculosis need not be considered in the etiology of Legg's disease.

STULIK, Chicago.

BASIS OF ACTINO THERAPY IN HAY FEVER AND ASTHMA. A. R. HOLLENDER and M. H. COTTLE, J. Radiol. **6**:41, 1925.

These investigators believe there is a definite indication for the actinic ray in the treatment of hay fever and asthma. From a considerable series of cases they conclude that in the perennial type of hay fever there is a marked lowering of the calcium content of the blood. This is true to a lesser degree in the seasonal variety and in asthma. The degree of hypocalcemia is not an indication of the severity of the symptoms. In the perennial type local nasal treatment often aggravates the condition. In the seasonal variety desensitization of the nasal membranes is advised. Medical diathermy followed by ultraviolet radiation has been used to advantage by the authors.

The surgical removal and correction of definite nasal defects is indicated. The general health and focal infection, wherever located, should receive attention. They recommend giving calcium by mouth with parathyroid and thyroid, hoping thus to raise the calcium content of the blood. A series of general exposures to the quartz light is recommended as a further aid in raising, and more especially maintaining, the blood calcium.

CHAMBERLAIN, Chicago.

A CASE OF KALA-AZAR IN AN INFANT. MARTHA WOLLSTEIN, New York State J. M. **25**:413 (March 13) 1925.

Three cases of visceral leishmaniasis have been recorded in children in America, all having come to the United States from the Mediterranean region. Necropsy was obtained only in the case here reported. The patient, a Sicilian boy, aged 21 months, developed a slight intermittent fever when 18 months old, in October, 1923, ten days before sailing for America. Five days before admission to the hospital (Jan. 7, 1924) a small dark blue spot appeared on the left cheek. The child's father, a physician, familiar with the condition, was sure the child was suffering from leishmaniasis. Two days after admission, marrow withdrawn from the upper portion of the shaft of the left tibia yielded the diagnostic Leishman-Donovan bodies. The lesion in the left cheek took on the character of a definite noma and progressed to perforation, death occurring three weeks after the appearance of the ulcer, and three and three fourths months after the first symptoms noted.

At necropsy Leishman-Donovan bodies were found in the spleen, liver and kidneys. Some evidence was obtained indicating that the necessarily late administration of 1 per cent. antimony tartrate had been partially effective, the secondary infection from noma constituting the immediate cause of death.

GRAVES, New York.

A CASE OF CELIAC DISEASE WITH GLYCOSURIA. F. J. POYNTON and L. B. COLE, Brit. J. Child Dis. **22**:30, 1925.

A boy, aged 7 years, had been fed on cow's milk from birth. At 3 months of age, it was noticed that his abdomen was large and that he had bulky putty colored stools, which at times were offensive. When 6½ years old, he had an attack of acute diarrhea lasting a day, and thereafter lost weight rapidly.

Three months after the attack he became very thirsty and developed polyuria. When seen at the age of 7 years he was extremely pale and emaciated with a large distended abdomen. The urine sugar was 6 per cent., the blood sugar 0.44; blood diastase 2 units (normal from 3 to 10); fat in feces, 78.6 per cent. split, 21.4 unsplit.

The interest of this case lies in the fact that associated in the same child there were two profound disorders: an inability to absorb fat, seen typically in celiac disease, and an inability to utilize carbohydrate, seen typically in diabetes mellitus.

The sudden onset of severe glycosuria with a high blood sugar suggests the possibility of a pancreatic lesion, though analysis of the stools and urinary and blood diastase estimations do not suggest such a lesion.

A Case of Orchitis and Abdominal Pain Occurring as a Complication of Serum Sickness. E. W. Goodall, Brit. J. Child. Dis. **22**:39, 1925.

A boy, aged 10 years, was admitted for faucial and nasal diphtheria; 12,000 units of antitoxin serum was given on admission, 12,000 units seven days later and 9,000 units the day following that. Albuminuria existed from the sixth to the tenth day after admission. The exudate on the fauces disappeared the eleventh day after admission and from the thirteenth to the sixteenth day urticaria existed on the abdomen at the site of one of the injections.

During the third week after admission the boy developed pain in the left iliac fossa, then pain in both knees, elbows and wrists, and finally pain in both testicles. The testicles remained swollen and tender for twelve days.

Langmann, New York.

Congenital Heart Disease. R. A. Fleming, Tr. Med.-Chir. Soc. **103**:191, 1923-1924 (in Edinburgh M. J., July, 1924).

Fleming showed a patient, a girl, aged 12, with a presystolic thrill in the mitral area and a systolic thrill in the pulmonary area. There were no other symptoms of cardiac disease except an enlarged heart. He considered that the thrills were due to a patent septum or to the remains of intra-uterine endocarditis.

Case of Congenital Pyloric Stenosis. C. McNeil, Edinburgh M. J. **32**:42 (March) 1925.

The end-results at 5 months of age in a boy who had severe vomiting and gastric hyperistalsis at the age of 1 month, were: a gain of 5¼ pounds, disappearance of vomiting and peristaltic wave. These were obtained by continuance of breast feeding and by gastric lavage twice daily. McNeil agrees with the profession in Great Britain that early diagnosis and treatment permit the maintenance of breast feeding as a factor of safety in the outcome, and that the characteristic vomiting and increased peristalsis are sufficient for diagnosis.

Congenital Cardiac Defect in Children. Agnes R. MacGregor, Edinburgh M. J. **32**:72 (Feb.) 1925.

This is a description of the symptoms and the postmortem finding in a girl, aged 4 weeks, with transposition of the primary vessels due to maldevelopment of the aortic septum. Instead of the septum taking the normal spiral

course during development, it probably took a straight course in this instance, which brought the aortic portion into communication with the right ventricle and the pulmonary portion with the left ventricle. Oxidation of the blood was maintained by an open foramen ovale and ductus arteriosus. The infant had shown intermittent cyanosis due to myocardial failure or the foramen may have become occluded by muscular contraction. This type of transposition was described by Baillie in 1797, and by Farre in 1814. No defect in the intraventricular wall or elsewhere in the heart was present in this case.

NEFF, Kansas City, Mo.

THE NUCLEATED RED CELLS FOUND IN THE CIRCULATION IN PERNICIOUS ANEMIA. A. PINEY, J. Pathol. & Bacteriol. **27**:249, 1924.

The nucleated red cells found in the circulation in pernicious anemia were of three types: normoblasts, macroblasts and megaloblasts. The megaloblast with its nucleus of basichromatin arranged in a very fine reticulation is the typical cell of pernicious anemia. It was found in one case of *Bothriocephalus* anemia but not in any other. No megaloblasts were found in three cases of anemia in childhood.

HELMHOLZ, Rochester, Minn.

HYPERTROPHIC CIRRHOSIS, HYPERSPLENOMEGALY WITH PERICARDITIS. CURRIEU and JANBON, Arch. de méd. d. enf. **28**:104 (Feb.) 1925.

The authors cite an interesting case of hypertrophic cirrhosis with hypersplenomegaly and pericarditis in patient, aged 20 years. The disorder began insidiously about twelve years before with abdominal distention and dyspnea on effort, progressing until the patient was unable to work. Epistaxis and gingival hemorrhages occurred several times daily. The father and the patient himself were both alcoholic. Although no definite history of syphilis could be elicited, the mother of the patient had had two miscarriages and one stillborn child. The patient was greatly emaciated and showed evidence of infantilism. The abdomen was greatly distended and the collateral circulation about the umbilicus prominent. The liver and spleen were greatly enlarged but there was no ascites. Signs of pericarditis were present. The skin had a cyanotic hue and the lower extremities were edematous. This case could well be placed in the class of cirrhosis described by Hutinel. Of particular interest is the occurrence of the condition in a subject, aged 20 years, for it is usually found during the first 5 or 6 years of age. The evidence of hepatic infantilism is in keeping with this type of case. The complexity of the cause is of interest. There is a certain alcoholic basis and probably a syphilitic basis from the maternal history, and a positive Bordet-Wassermann reaction was found during one of several examinations.

THE ANEMIA OF VON JACKSCH-LUZET. ENRIQUE A. BERELEROIDE and ANDRES BIANCHI, Arch. de méd. d. enf. **28**:144 (March) 1925.

The subject is discussed in detail and the observations of two cases are reported. The authors propose a new classification of the erythropathies. They emphasize the difficulty of establishing a diagnosis in a precise manner in many instances. However, the finding hematologically of a pernicious red cell reaction with or without an embryologic reaction of the white elements, and hepatosplenomegaly is suggestive of von Jacksch anemia. Every time that the beforementioned picture is found and the type confirmed, the prognosis is fatal. Congenital syphilis is found in a large number of these patients.

MULTIPLE CONGENITAL MALFORMATIONS OF THE HEART. S. POLTORZYCKA and K. K. CIESZYNSKI, Arch. de méd. d. enf. **28**:170 (March) 1925.

A case of congenital heart disease is reported. At necropsy the following lesions were found: (1) persistence of the foramen ovale; (2) interventricular communication; (3) persistence of the ductus arteriosus; (4) existence of the common trunk of the vena cava; (5) separation of the coronary venous sinus from the venous part of the right auricle; (6) inverse insertion of the aorta and the pulmonary artery; (7) reduplication of the pulmonary veins, and (8) hypertrophy of the right side of heart. The authors mention the impossibility of diagnosing more than pulmonary stenosis and persistence of the ductus arteriosus clinically.

BONAR, Salt Lake City.

A CASE OF ACROCEPHALY WITH SYNDACTYLISM. VINCENZO NASSA, Clin. Pediat. **3**:170-177, 1925.

F. A., a girl, aged 57 days, whose family history was irrelevant, was born after a normal labor following a normal period of gestation. The anomalous hands, feet and head were present at birth. The infant was nursed by her mother, with supplementary feedings of cow's milk because of the maternal deficient milk production. Her appetite was excellent and the weight increase was within normal limits. She was brought to the hospital because the mother desired surgical treatment for the deformed limbs.

The findings, compared with those of reported cases, show the following characteristic and noteworthy points:

1. The complete fusion of the fingers of the hand was not seen as completely in reported cases as in this one.
2. The marked asymmetry of the cranial bones.
3. Congenital cataract of the right eye.
4. The presence of a slight macroglossia.

In discussing the possible etiologic factors, the following were considered and eliminated:

1. Maternal impressions during pregnancy (physical or traumatic).
2. Syphilis.

The author states that all reported cases of acrocephaly and syndactylism resemble each other in description and by photographs. The condition must therefore be a distinct entity and there may be a difference in each case, especially regarding the quantity of the deformity.

ZAMBARANO, Washington, D. C.

GAUCHER'S DISEASE. LUDWIG PICK, Med. Klin. **20**:1399, 1924.

A description is given of Gaucher's disease from Gaucher's first article in 1882 to Epstein's report in 1924. The cases coming to necropsy are listed. Of thirty-two cases, twenty were females, twelve cases were in children under 15 years of age (three infants were of 12 months, 12 months and 8 months respectively). In one case the spleen and liver enlargement were noted at 6 months of age. There may be a basis for the opinion that the disease is congenital. In eleven cases the disease was familial but not hereditary. Pick describes the usual symptoms of the disease. Among the unusual symptoms found were: one case with ascites; one positive Wassermann reaction; two

cases with tuberculosis, and one spleen weighing 8,100 gm. In two children there was splenomegaly without macroscopic enlargement of the liver.

GAUCHER'S DISEASE. LUDWIG PICK, Med. Klin. **20**:1433, 1924.

Continuing his clinic, Pick here reviews the histopathology of the disease, describing the various methods of preparing and of staining the tissues. In the pathologic anatomy of Gaucher's disease there are two outstanding characteristics: First, the infiltration into the spleen, liver, lymph glands, and bones of the large Gaucher cells; and second, the structural characteristics of the cell which is specific for Gaucher's disease.

GAUCHER'S DISEASE. LUDWIG PICK, Med. Klin. **20**:1526, 1924.

Pick gives an extensive review of the histogenesis and pathogenesis of the disease. He considers the theories of the origin of the Gaucher cells from the endothelium or from the reticulum. Aschoff's reticulo-endothelial system may offer a site of origin for the specific cells. The reticulo-endothelial cell system has a wide limit of possibilities. It reacts in a variety of ways to many forms of irritation. One site of origin of the Gaucher cells, regardless of the source, is probably in the spleen. There is evidence suggesting that the cells may also be found in the capillary-endothelial system of the liver. It has been proved that Gaucher cells are formed in the lymph nodes.

GAUCHER'S DISEASE. LUDWIG PICK, Med. Klin. **20**:1561, 1924.

A differential diagnosis is made between Gaucher's disease, the similar lipoid cell hyperplasia of diabetic lipemia, and a new disease, of which several cases were reported before Niemann's report in 1914. This unusual pernicious disease of childhood is characterized by a greatly enlarged spleen, progressive failure, brownish skin, enlargement of the liver and markedly enlarged retroperitoneal glands. Four cases have been reported, all in females, who died at the ages of 18, 15, 11, and 9 months respectively. This conditions probably is not Gaucher's disease.

CHRONIC JOINT DISEASES TREATED WITH SULPHUR. K. ISAAC-KRIEGER and G. NOAH, Med. Klin. **20**:1579, 1924.

Intramuscular injections of precipitated sulphur in olive oil (from 0.01 to 1 per cent.) were given in the treatment of polyarthritis, arthritis deformans and other joint diseases. In some cases intravenous injections were given, followed by improvement of the condition.

GAUCHER'S DISEASE. LUDWIG PICK, Med. Klin. **20**:1774, 1924.

Pick believes that Gaucher's disease has little to do with xanthelasma or with the experimentally produced pseudo-Gaucher's. The cholesterin content of the blood is always normal or below normal. The cell substance in the Gaucher cells belongs in the range of the lipoids. The cells have been attributed in their origin to the epithelial system, endothelial system and to a general constitutional reaction. It seems to Pick that the large cells act as giant cells and that they absorb a foreign substance. This agrees with Mandlebaum-Downey's idea that Gaucher's disease is caused by some metabolic disturbance, the products being found in the specific group of cells—the "reticular phagocytes."

PETERMAN, Rochester, Minn.

Nervous Diseases

SOME CLINICAL ASPECTS OF THE STUDY OF FIFTY CASES OF TETANY. ROBERT M. LORD, Boston M. & S. J. **192**:606 (March) 1925.

Carpopedal spasm was noted in 34 per cent.; convulsions in 52 per cent.; laryngospasm in 64 per cent., and Chvostek and the Weiss (contracture of orbicularis palpebrarum) phenomenon in 80 per cent. of the cases. Attention is called to frequent occurrence of edema under the eyes. The elicitation of Trousseau's sign and the cathodal opening contracture are decried because of the pain produced and the danger of precipitating convulsions.

Of the fifty cases studied, twenty-eight (56 per cent.) occurred in March and April.

Marked improvement occurred under treatment with large doses of cod liver oil and oil of phosphorus (1 dram and 1 minim, three to six times daily) both with and without calcium chlorid (10 grains).

GENGENBACH, Denver.

ATROPIN AND THE HYPERTONIC INFANT. ARTHUR A. SHAWKEY, West Virginia M. J. **17**:201 (Dec.) 1922.

Pylorospasm is referred to as the chief symptom of hypertonicity.

The occurrence of similar spasms of the anal sphincters causing the so-called spastic constipation, and of similar spastic contractions of any and all parts of the gastro-intestinal tract is stressed.

The hypersensitive infant seems strong and is very active. It cries much and hard; rarely fretting or crying lightly as does the normal infant when hungry or uncomfortable.

What is discomfort to the normal baby is real pain to the hypertonic infant, because of its hypersensitiveness, hence it is a colicy baby.

Very prompt relief is given in practically all these cases, pylorospasm included, by atropin sulphate in doses beginning with $\frac{1}{1000}$ grains or less, and increasing gradually and with caution.

Other methods of treatment are mentioned but not discussed.

Case records are given.

SHAWKEY, Charleston, W. Va.

MYOTONIA CONGENITA (THOMSEN'S DISEASE). E. BRAMWELL, Tr. Med.-Chir. Soc. **103**:323, 1923-1924 (in Edinburgh M. J., 1924).

Prof. Edwin Bramwell has seen only four cases of this rare disease in twenty-three years, two cases being in brothers. He presented a case in a boy, aged 11, characterized by the striking muscular development, there being hypertrophy of the masseters causing a roundness of the face and a hypertrophy of the calf muscles resembling pseudohypertrophic paralysis. The muscles of the eyes and of the hands were also involved. Myotonia was the chief symptom. There is no cure, but the disease does not shorten life.

FACIAL IRRITABILITY: ITS RELATION TO CONVULSIVE DISORDERS, AND ITS GENERAL SIGNIFICANCE IN INFANCY AND LATER CHILDHOOD. CHARLES MCNEIL, Edinburgh M. J. **31**:651 (Dec.) 1924.

McNeil has tested the facial irritability (Chvostek's sign) in 403 children with muscular convulsions. He classifies the children into two age groups: those up to 2½ years of age and those beyond. He uses the term "spasmophilia" for children of the younger group who have one or more of the three mani-

festations of convulsive seizures: laryngeal spasm, general convulsions and carpopedal spasm (tetany). In this group, facial irritability (abbreviated F. I.) is an evidence of active or of latent spasmophilia.

The writer makes some interesting observations about the facial phenomenon: its presence indicates a high degree of irritability of the superficial fibers of the facial nerve, whereby a light tap on the face midway between the corner of the mouth and the angle of the jaw causes a lateral jerk of the middle of the upper lip; in the more irritable cases there occurs also a jerk in the side of the nose and on the forehead above the nose. The reaction is usually obtained on both sides. When an infant cries the facial reaction cannot be obtained. There is, however, a general irritability and a response can be elicited by tapping the upper arm (musculospiral nerve), the back of the elbow (posterior interosseous nerve) and the leg (peroneus nerve at upper end of fibula). Electrical irritability tests are similar. One should not mistake the percussion wave of the cheek in fat infants and a jerk of the eyelids for a positive reaction. Crying, general convulsions for a few hours, fever and fasting may hold the reaction in abeyance.

The conclusions from McNeil's tests are that nearly all cases of spasmophilia give a positive Chvostek sign, and are usually associated with rickets; rickets without spasmophilia seldom has facial irritability. In rickets without any kind of previous convulsions, the probability of developing convulsions later is indicated by a severe facial jerk and a marked atonicity of the muscles.

In the first age group (up to 2½ years) general convulsions, not due to spasmophilia, seldom have facial irritability.

After 2½ years of age, when facial irritability is present, there are usually digestive disorders; in five out of eight cases of celiac disease the facial jerk was positive; facial irritability is not associated with asthma, neuropathic constitution or organic nervous diseases; in most older children the sign is without significance.

NEFF, Kansas City, Mo.

HISTOPATHOLOGICAL OBSERVATIONS IN AN UNSUSPECTED CASE OF CHRONIC EPIDEMIC ENCEPHALITIS IN A YOUNG CHILD. C. DA FANO and H. INGLEBY, J. Pathol. & Bacteriol. **27**:349, 1924.

Report is made of a severe case of encephalitis resulting in a clinical condition similar to juvenile amaurotic idiocy. At necropsy widespread diffuse lesions affecting the entire brain were found. Minute bodies, described by the authors in a previous paper, were found particularly in the lower gray layers of the cerebral cortex. No definite opinion has been formed as to the nature of these bodies.

HELMHOLZ, Rochester, Minn.

SOME FACTORS CONCERNED IN THE ETIOLOGY OF TETANY IN RICKETS. G. H. ANDERSON and S. GRAHAM, Quart. J. Med. **18**:62, 1924.

The authors review the work done on the relation to tetany of calcium content of the blood and changes in the acid-base equilibrium, adding a number of their own observations. They naturally encountered difficulty in defining what was to be considered "latent" tetany in doubtful cases, and they have relied on the facial phenomenon rather more than most. In regard to calcium they found that while active tetany was always accompanied by a diminished content of calcium in the blood, there was no definite relation between the severity of the symptoms and the amount of reduction of calcium. A diminution in the alkaline reserve always led to the disappearance of the signs of tetany irrespective of a change in the calcium content of the serum,

whether the alkaline reserve was lowered artificially as after administration of sodium chlorid or ammonium chlorid or naturally as during the acidosis of gastro-enteritis. The authors have not seen symptoms of tetany follow the use of sodium bicarbonate, even when the alkali reservé of the plasma was considerably above normal, nor were any of the cases of tetany studied associated with an increase in the alkali reserve. JOSEPHS, Baltimore.

THE OCULOCARDIAC REFLEX IN THE NURSLING. M. ZALEWSKI, Arch. de méd. d. enf. **28**:73 (Feb.) 1925.

A review of the literature on this subject shows that the results obtained are incomplete and inconstant. The author made observations while the infant was on its back. Pressure was made on the right eyeball and the heart beat was counted for fifteen seconds. As a control, a count was taken without pressure on the eyeball. A kymograph was used for new-born infants. A chronograph recorded the time and the heart beat registered by an electric signal. Suction and deglutition exert no influence on the rate and may be practised while the tests are being made in order to keep the infant quiet, since it was found that during crying the heart rate is accelerated just before the cry and slowed at the time of the cry. An acceleration of the heart rate on compression of the eye was not observed in any case. With compression of the eye, a latent period before manifestation of the slowing is produced.

Observations were made on eighty infants, aged from 1 month to 1 year, with no history of nervous symptoms. In two (2.5 per cent.) the phenomenon was absent. In thirty-eight (47.5 per cent.) the rate was retarded from 5 to 10 beats per minute, in twenty-nine (36.2 per cent.) the rate was retarded from 10 to 12 beats, and in eleven (13.7 per cent.) there was a slowing of over 12 beats per minute. In infants under 1 month, the reaction was either absent or feeble. In ten babies, aged from 1 to 7 days, the reflex was not positive and was very feeble at 7 days. Of five infants, aged 2 weeks, two were negative, one was feebly positive and two were strongly positive. The results of experiments made on eight new-born dogs and one adult dog were practically the same. The author concludes that the oculocardiac reflex is physiologic in the first year, being found in a light and moderate degree in most healthy infants. It is absent in the new-born and slight in the first weeks of life. It is most probably due to insufficient development and feeble excitability of the vagus centers in the bulb.

SYPHILITIC MENINGO-ENCEPHALITIS SIMULATING GENERAL PARESIS. P. BEZY and RISER, Arch. de méd. d. enf. **28**:109 (Feb.) 1925.

The patient, a boy, aged 12 years, was apparently normal up to the age of 10 years, when mental deterioration began. Later, motor symptoms appeared and progressed until finally there was definite paresis of the extremities with poor coordination. Slight atrophy of the thenar eminences and interossei muscles was present, also slight contracture of the flexors of the forearms and extensors of the legs. The reflexes were normally active, the cerebrospinal fluid Wassermann test was strongly positive, the lymphocytes numbered 15 per cubic millimeter and albumin tests were positive. Under intensive and antisyphilitic treatment, marked improvement occurred. From the study of this case, the authors conclude that in children showing a clinical picture of general paresis, the prognosis is not necessarily grave, for these signs do not seem to have the intensity and rapid progression found in the adult. These children should be given intensive and prolonged treatment.

ETIOLOGIC REMARKS ON FACIAL PARALYSIS OCCURRING SIMULTANEOUSLY IN SEVERAL INFANTS. P. NOBÉCOURT, Arch. de méd. d. enf. **28**:137 (March) 1925.

Six infants were attacked with peripheral facial paralysis, nearly all within a short space of time. Five presented phenomena, suggesting a relationship to the zoster virus, to encephalitis virus or to poliomyelitis virus. The spinal fluid of the three children in whom puncture was done showed a meningeal reaction. Modern researches speak for an infectious origin of some forms of facial paralysis and the observations made on these cases tend to confirm this.

BONAR, Salt Lake City.

THE PATHOGENESIS OF DYSTROPHIA ADIPOSOGENITALIS. E. J. KRAUS, Med. Klin. **20**:1290, 1924.

Kraus cites the various theories of the etiology of the disease and then describes three cases of adiposogenitalis dystrophia in which the necropsy findings were: in one, chronic tuberculosis of the brain with a tubercle in the stalk of the hypophysis; in a second, a psammous tumor in the sella which had destroyed the pars intermedia; in the third, an enlarged hypophysis in which two thirds of the posterior lobe was replaced by a basophilic adenoma.

Kraus also cites four cases with lesions in the pituitary, one, a tuberculoma, and three with carcinoma metastasis, but with no signs of adiposogenitalis dystrophia.

PETERMAN, Rochester, Minn.

Diseases of the Nose and Throat

THE INCIDENCE OF INFECTIONS IN TONSILLECTOMIZED CHILDREN. ALBERT D. KAISER, New York State J. M. **25**:469 (March 20) 1925.

From about 40,000 school children, two groups, each containing 1,200 were observed, one a group on whom operation had been performed, the other a control group who failed to accept operation. Both groups, which were composed of children with diseased or obstructive tonsils and adenoids, were examined three years after the recommendation for operation and a comparison relating to infections during the period was made, with consideration as to sore throats, colds, infected ears, adenitis, deeper respiratory infections, measles, scarlet fever, diphtheria and the rheumatic syndrome.

The authors conclusions from the collected data were as follows:

1. Tonsillectomy offers great relief from attacks of sore throat and tonsillitis.

2. It offers considerable relief to the child subject to head colds, especially where much adenoid tissue is present.

3. It will lessen the chances for glandular infection, but is no guarantee against it nor does it assure the immediate disappearance of large glands.

4. It lessens the chance for ear infections, but they do occur frequently in spite of it.

5. It does not influence favorably or unfavorably infections of the larynx, bronchi and lungs, as they occur in both groups.

6. It does not prevent scarlet fever or measles, but may influence the severity of the infection.

7. It seems to lessen the incidence of diphtheria by removing fertile soil for the diphtheria bacillus.

8. It has not influenced the incidence of chorea or rheumatism.

9. It has shown a lessened incidence of heart disease over a period of three years.

GRAVES, New York.

SEPTIC OTITIC THROMBOSIS. J. S. FRASER, Tr. Med.-Chir. Soc. **103**:75, 1923-1924 (in Edinburgh M. J., 1924).

Fraser reviews Turner's reports of nearly 6,000 cases of chronic middle ear suppuration, in which there were 733 mastoid operations. One in every 174 chronic otitis media cases developed septic sinus thrombosis. Of twenty-eight cases, nineteen were in the first two decades of life. Chilliness or rigors are the most important symptoms; fever is usually higher at night but is not of so much diagnostic help in children as in adults. In sinus thrombosis there is a flushing of the cheeks, the sensorium is clear; in brain abscess the face is pale, the patient drowsy; in early purulent meningitis there is restlessness and fright. The prognosis is made worse by delay in operating when the patient has middle ear suppuration with earache and chilliness. Of these twenty-eight acute and chronic cases 64.3 per cent. recovered.

Dr. Douglas Guthrie, in discussion, stated that meningitis is a more frequent complication of otitis media in childhood than sinus thrombosis, and is inoperable.

Dr. W. T. Gardiner treats the aural bacteremia in childhood, which is present in the first two weeks of otitis media before sinus disease appears, with 50 c.c. of antistreptococcus serum every twelve hours for three doses intramuscularly; all his patients recovered.

NEFF, Kansas City, Mo.

Diseases of the Skin

URTICARIA PIGMENTOSA WITH HYPERPLASIA OF THE THYMUS GLAND. LESTER HOLLANDER, Arch. Dermat. & Syph. **11**:611 (May) 1925.

Urticaria pigmentosa is an infrequent condition, which has its onset in early infancy. It is chronic, often clearing up as puberty approaches. The author reports two cases, one a nodular and one a maculopapular type, in which a relationship of the disease to enlarged thymus is indicated. The skin lesions disappeared in the one case in which radium was applied over the thymus.

GLUCOSE TOLERANCE REACTIONS IN ECZEMA. SAMUEL AYRES, JR., Arch. Dermat. & Syph. **11**:623 (May) 1925.

In a series of eighty-six consecutive cases of typical eczema, one-fourth showed an abnormally high or prolonged blood sugar curve with a glucose tolerance test. The average age in the abnormal cases was 42.4 years. In at least some of the abnormal cases the patients apparently had diabetes. The eczema responded to diabetic therapy.

JEANS, Iowa City.

CONGENITAL LYMPHANGIECTATIC EDEMA. HAROLD O. RUH and LEON H. DEMBO, J. A. M. A. **84**:1410 (May 9) 1925.

A case of congenital lymphangiectatic edema, usually called congenital elephantiasis, is reported. At birth, edema of the left leg, thigh and foot, left labium majus, right shoulder, right arm, hands and fingers, right lower lip,

right ear and the right upper and lower eyelids were found. There was complete macroglossia and enlargement of the right axillary lymph glands. The condition has resisted all forms of treatment tried, and has shown no tendency to improvement. A definite etiology has not been established, but the evidence presumes a congenital defect in the lymphatic system. This is a rare form of edema, and is to be differentiated from cases listed under the term congenital elephantiasis.

BONAR, Salt Lake City.

HYPERTROPHY OF THE BONES OF A LIMB DUE TO A NEVUS. DONALD PATERSON and W. G. WYLLIE, Brit. J. Child. Dis. **22**:36, 1925.

A boy, aged 7 years, with the right leg 1 inch longer than the left, which was first observed at the age of 4 years. The surface temperature of the right knee and leg were appreciably higher than that of the left. Patches of brownish pigmentation were present on the skin of the right knee and upper part of shin. In the same area some enlarged blood vessels could be felt and there was slightly increased growth of hair. A roentgenogram showed both femur and tibia longer on the right but no other difference in structure. There was no other asymmetry. Congenital hemihypertrophy and local gigantism or lymphangioma were excluded.

LANGMANN, New York.

IMMUNITY AND SENSITIZATION IN RINGWORM AND FAVUS, THEIR TREATMENT WITH VACCINE. R. C. LOW, Edinburgh M. J. **32**:21 (Feb.) 1925.

Low reviews human and animal experimentation with the use of an extract of ringworm fungus. Passive immunity cannot be produced. He found the skin tests of little value in diagnosis. Ringworm of the scalp does not disappear spontaneously until the child reaches 14 years of age. In children, the fungus invades the hair in and close to the follicle, never up the shaft of the long hair as with adults. He explains this on the possible difference in the shape of the neck of the hair follicle at the two ages. Roentgen-ray treatment of ringworm of the scalp cures the disease in about four months. The writer tried to shorten the treatment by using microsporin extracts as vaccine but was unsuccessful. He thinks it unlikely that vaccine can be of use. Deep infections of ringworm produce sensitization, while superficial ringworm such as of the scalp does not sensitize and therefore is not cured spontaneously.

NEFF, Kansas City, Mo.

HERPES ZOSTER AND VARICELLA. C. C. AVIRAGNET, J. HUBER and DAYRAS, Bull. et mém. Soc. méd. d. hôp. de Paris, 185 (Feb. 12) 1925.

This is a report of two cases in which a relation could be established between varicella and herpes zoster. In the first patient, the disease commenced with a typical eruption of varicella, then two days later herpes zoster appeared and lasted for four more days while the generalized eruption cleared up. The other was a case of herpes zoster, typical in all respects, without any lesions of a more generalized nature, which was followed exactly fourteen days later by an attack of varicella in the two brothers of the patient who had not been otherwise exposed. Moreover, the child who had had herpes zoster did not contract varicella later on as he would have, had he not been protected by the attack of herpes. The authors do not claim that the virus of varicella is the cause of all cases of herpes zoster but merely state their belief

that varicella may exist in two forms, the one characterized by the classic eruption, the other by the eruption of herpes zoster.

JOSEPHS, Baltimore.

Surgery and Orthopedics

APPENDICITIS IN CHILDREN WITH REPORT OF CASES. J. VAN AMBER BROWN, Am. J. Obst. & Gynec. **9**:463, 1925.

The early diagnosis and surgical treatment of appendicitis is rendered more difficult by the difference in anatomy of the child and adult. The structure of the appendix is also different in children, and may be an important factor in the etiology of appendicitis.

The death rate in the United States, England and Wales is high and seems to be on the increase, due almost entirely to late diagnosis. The author lays more emphasis on the clinical manifestations in the diagnosis than on the laboratory work.

A brief outline of 700 cases is included in the report. In the series acute appendicitis was twice as common in males as in females.

Pain was the initial symptom in 98 per cent. of cases and nausea with vomiting occurred in 93 per cent.

The author concludes that the combined Murphy-Ochsner-Fowler-Alonzo-Clark-Crile treatment is the best in patients with peritonitis, both before and after operation or where operation is deferred. But in all others, removal of the appendix is the only proper treatment.

SARCOMA OF THE OVARY IN CHILDREN AND YOUNG GIRLS. LEWIS C. SCHEFFEY, Am. J. Obst. & Gynec. **9**:490, 1925.

The author reviews the literature on 118 cases of sarcoma of the ovary in children up to 20 years of age, and reports in detail a personal case in a girl, aged 16 years.

He finds that sarcoma of the ovary in general is a trifle less than 4 per cent. and from 18 to 25 per cent. of all ovarian neoplasms in children are sarcomas. An average of 14.3 per cent. of these occur before the age of 20 years; 58.8 per cent. occurred before 14 years.

The round cell sarcoma was the commonest type and all were more commonly unilateral. Only about one quarter of the patients gave evidence of precocity.

The most important objective symptom was a rapidly growing, freely movable abdominal or pelvic tumor.

ALLEN, Chicago.

INTESTINAL OBSTRUCTION BY ASCARIS LUMBRICOIDES, SIMULATING INTUSSUSCEPTION. CLAUDE L. HOLLAND, West Virginia M. Monthly **20**:190, 1925.

The author reports the case of a girl, aged 3 years, who was taken suddenly ill with severe abdominal pain, paroxysmal in character, followed promptly by vomiting; frequent desire to defecate with unsuccessful effort, and subnormal temperature.

All symptoms were relieved by $\frac{1}{24}$ grain of morphin hypodermically.

There was a recurrence of all symptoms six days later, when a sausage shaped mass presented in the left lower quadrant.

A diagnosis of intussusception was concurred in by two consultants.

Operation revealed a tumor 8 inches long in the upper portion of the ilium, composed of forty-nine roundworms.

SHAWKEY, Charleston, W. Va.

DIAPHYSEAL ACLASIS (MULTIPLE EXOSTOSES). J. W. STRUTHERS, Tr. Med.-Chir. Soc. **103**:242, 1923-1924 (in Edinburgh M. J., 1924).

Struthers showed a girl, aged 13, with characteristic irregularity in the shape of the metatarsal bones of the feet, the diaphyseal ends of the long bones of the legs and arms, the metacarpal bones, one scapula, one clavicle and several ribs. The bones were straight and not malformed elsewhere than at the diaphyseal ends. The general health and physique were good, the intelligence normal, but there was symmetrical enlargement of the thyroid gland. The exostoses had existed since birth. Sir Arthur Keith had suggested the name of diaphyseal aclasis to replace the older term of multiple exostoses.

ENTEROSTOMY IN ACUTE INTESTINAL OBSTRUCTION. K. P. BROWN, Edinburgh M. J. **31**:663 (Dec.) 1924.

In reciting cases of intestinal obstruction two of four of these being in children, Brown concludes that early operation is necessary, but that certain patients will not get well from simple relief of the obstruction because of the continued toxemia. Drainage of the proximal bowel by an enterostomy with or without reduction of the obstruction gives better results.

REMOVAL OF HATPIN FROM THE DUODENUM. A. A. SCOT SKIRVING, Edinburgh M. J. **32**:37 (Feb.) 1925.

A girl, aged 3½ years, swallowed a hatpin 2 inches in length, which penetrated the wall of the duodenum, the point invading the cortex of the right kidney. The child had shown no symptoms, and peritonitis had not developed in the four days, the pin being enveloped in a fold of omentum. The pin was removed by duodenotomy with no bad results. The writer suggests that a simpler and much quicker method whether perforation had occurred or not would be at operation to push the point through the wall of the intestine, clip off the shaft of the pin and allow the head to remain within the canal.

INTERLOBULAR EMPYEMA ASPIRATION—RECOVERY. C. MCNEIL, Edinburgh M. J. **32**:43 (March) 1925.

McNeil describes a case in a boy, aged 8 years, who developed dulness in the right axilla following pneumonia; pus was withdrawn by aspiration in the third interspace, axillary line. The roentgenogram and the boy's general condition showed steady improvement after the one successful aspiration, with complete disappearance of the empyema. He cites the older teaching for the treatment of localized empyema in which aspiration is regarded as curative in certain cases.

NEFF, Kansas City, Mo.

EARLY TREATMENT OF PHIMOSIS IN CHILDREN. K. OCHSENIUS, Med. Klin. **20**:1501, 1924.

The author believes that far too many circumcisions are done on infants and children. He has hardly ever seen an indication for operation. Retraction can usually be done if attempted early, shortly after birth. Thereafter, frequent retraction and cleansing will suffice.

PETERMAN, Rochester, Minn.

OSTEOMYELITIS OF THE VERTEBRAL COLUMN IN INFANCY. DRAGA STOHR, Monatschr. f. Kinderh. **29**:730, 1925.

In a clinical report of two cases of osteomyelitis of the vertebral column, the author shows that it is a rare condition in infancy. The clinical symptoms vary from almost none to the most virulent sepsis with prostration, fever and death.

The localization usually is in the thoracic column and is confined to one vertebra, though of course more may be involved. Gibbus formation is infrequent.

GERSTLEY, Chicago.

Miscellaneous

IMPROVED METHOD OF INHALATION TREATMENT FOR INFANTS. B. T. STRONGMAN. Boston M. & S. J. **192**:602 (March) 1925.

Emphasis is laid on inability of youthful patients to raise their bronchial secretions; the author therefore instructs the mother or the nurse to lay the baby across her knees on its abdomen with the head hanging down and a steam kettle on the floor, thus combining postural drainage with the inhalation.

He claims, "from fifteen to twenty minutes in this attitude seems to accomplish better results than a longer séance in a tent."

GENGENBACH, Denver.

PHOSPHORUS POISONING IN A CHILD FROM THE INGESTION OF FIREWORKS. HUGH L. DWYER and FERDINAND C. HELWIG, J. A. M. A. **84**:1254 (April 25) 1925.

A case of fatal phosphorus poisoning in a child, aged 3 years, resulted from swallowing fireworks (a "spit-devil"). Seven other cases have been collected by the Division of Industrial Hygiene of the New York State Department of Labor. In animal experiments performed by the authors to determine the value of certain remedial measures and the pathologic changes brought about by phosphorus poisoning, castor oil was found to be an ineffective antidote but did not seem to increase the absorption of the drug. Liquid petrolatum, as recommended by Atkinson, and lavage one or two hours after the lethal dose was ingested, proved effective. The phosphorus produced a marked catarrhal gastritis with superficial epithelial necrosis, pronounced fatty changes in the liver and to a lesser degree in the kidneys and heart. Microchemical studies indicated that the bulk of this fat was glycerol ester. Cholesterol determinations on the plasma showed a definite increase twenty-four hours after phosphorus was given.

BONAR, Salt Lake City.

WISCONSIN'S PROGRESS IN CONQUERING DISEASE SHOWN GRAPHICALLY BY STATE BOARD OF HEALTH CHARTS. C. A. HARPER, Wisconsin M. J. **23**:624, 1925.

Graphs prepared by the Wisconsin State Board of Health portray infant mortality and the death rate in tuberculosis (all forms), meningitis, typhoid fever, scarlet fever, pertussis, measles, cancer, organic heart disease and nephritis. They outline what has been accomplished in the progress of conquering disease in Wisconsin. At the bottom of each graph one may note how Wisconsin compares with the rest of the United States as represented by the Registration Area.

It is a hopeful sign that the present effective program for eliminating infections in childhood may spell a resultant decline in heart disease in later life. Child welfare interest becomes, therefore, a definite means of extending the life span of the people.

KASTNER, Milwaukee.

Society Transactions

NEW ENGLAND PEDIATRIC SOCIETY

Boston, Mass., April 10, 1925

KENNETH D. BLACKFAN, M.D., *President*

CHILDREN'S PERSONALITY AND BEHAVIOR. Presented by DR. E. STANLEY ABBOT.

Pediatrics became a specialty because it was found that the infant's and the child's body and bodily processes were different from those of the adult. Similarly, the child's mind differs from the adult mind in its workings and there are individual mental differences between children of the same age. Differences in children of the same age are manifest as early as the first month. Some are placid, others excitable, some persistent, others giving up easily, some jolly and sociable, others sober and retiring. Some of these tendencies and traits are probably hereditary. One of the most important traits is a sense of dignity in ourselves as persons, those feelings which are hurt by ridicule, by being placed in an inferior position. This trait is unquestionably well developed at the age of 2 years. It is important because it is the basis of much of our conduct. Other differences are aroused by the internal reactions caused by the experiences of the child and external reactions which can be observed by others. The latter is an end-result of series of mental reactions. Our attitude and behavior toward children largely determines their attitude and behavior. If children make some maladjustments, the task of the adult is to try to see the world through their eyes and help them to better adjustments. This will help to maintain and to preserve their own self respect.

DEVELOPMENTAL DIAGNOSIS IN INFANCY. Presented by DR. ARNOLD GESELL.

What is the general relation between developmental diagnosis and pediatrics? Ordinarily, pediatrics is defined as that branch of medicine which deals with the diseases of children. This is the etymological, the historical and the basic meaning of the term.

The concept of disease, however, is broad, elastic and changing. It does not stand alone very well. Coordinate with and interlocked with the concept of disease, is the concept of development. Disease and defect are conditioned in all sorts of ways by the factor of age or the factor of growth. The child, at least, is always growing and at every level he is both a product and a prophecy of growth, and the physician must interpret health and disease in terms of the child's growth.

To developmental pediatrics fall the manifold but interrelated problems of child development from the standpoint of medical diagnosis, prevention and control. Development quite as much as disease falls within the science and the practice of medicine.

There are three major fields in which the development of the postnatal person is manifested: (1) the physical, (2) the physiologic, and (3) the psychologic. All of these fields are open to scientific observation, and potentially to developmental diagnosis. For the most part, however, the technic and the criteria of developmental diagnosis are unknown and wait for future research.

1. In the first field the manifestations of development are essentially anatomic, embracing height, weight, bulk, structure, topography and color. Every organ or system has its lawful changes in absolute size, relative size and histologic texture, which bear some significant and therefore diagnostic relation to the maturing of the individual. In his study of the ossification of the carpal bones, Rotch opened up the vast subject of anatomic age and the anatomic indicators of developmental status.

2. In the second field the indicators of individual development are of a biochemical or physiologic character. Changes in substance metabolism, energy metabolism, changes in the composition of body fluids, in endocrine activity and in the vegetative system—these also bear a lawful relation to developmental conditions. When such phenomena can be studied with discriminating refinement, our methods will determine physiologic age and become part of the technic of developmental diagnosis.

3. Finally, there are the developmental phenomena in the higher sphere of sensorimotor function, habit formation, symbolic thinking and social adjustment. This is the psychologic sphere, grafted on the tower. In the present context, however, too sharp a line between the physiologic and the psychologic should not be drawn. From a diagnostic point of view it would be futile to seek for an incontestible criterion of consciousness in early infancy. Controversial issues concerning the nature and significance of consciousness need not be raised. From the standpoint of developmental diagnosis we are primarily interested in all those forms of behavior, mediated by a nervous system which are coherently related to the attained maturity of that nervous system. We may conceive such behavior as being a functional index of developmental status. An infant is as old as his behavior.

In this sense the mind becomes an observable object within the scope of developmental diagnosis.

For several years we have been attempting at the Yale Psycho-Clinic to determine behavior norms of infancy, and to define diagnostic procedures which might enable us to make objective estimates of developmental status in early life. Briefly our investigation has been as follows.

Ten levels of development covering the preschool period from birth to the sixth year were studied. As the embryologist cuts his specimens with serial sections to determine the lines of growth, so we have taken a series of cross sectional views of individual capacity and behavior at ten ascending levels: 1, 4, 6, 9, 12 and 18 months, and 2, 3, 4 and 5 years of age. The total investigation embraced about 500 normal children—fifty at each level. These children were examined at our psychoclinic, at infant welfare and health centers and in their homes.

The method of approach throughout the investigation was of an observational, clinical and natural history type. Appropriate test situations were devised to bring out characteristic capacity and behavior at each age level. The psychologic examination of the subject was supplemented by an analytic interview with the parent. The purpose of the whole inquiry was to formulate concrete behavior items both characteristic and distinctive of the various age groups.

These behavior items are objective and recordable. They relate to motor control, language, adaptive (or intelligent) behavior, and personal and social behavior. The whole array of items, over 150 in number, has been codified into a set of ten developmental schedules, one for each age level studied.

By means of these schedules it is possible to make a somewhat detailed descriptive and analytic record of the developmental status of a child in terms

of capacity and behavior. Purely numerical formulations are avoided. A premium is placed on descriptive, interpretive diagnosis, and the importance of a unifying comparative approach is emphasized.

In connection with the investigation numerous action photographs were taken both of normal and of clinical subjects (specimens of these were shown by stereopticon *).

The most obvious field of application for the normative data and diagnostic procedures outlined in the foregoing, lies in the early recognition of mental deficiency. Although nearly all cases of mental deficiency are still beyond medical relief, we must assume that early diagnosis will lead at least to better educational management. Even in the field of mental defect and deficiency we must place a medical premium on early diagnosis.

But apart from mental deficiency, the methods of developmental diagnosis may be utilized to hasten discovery and control of significant conduct disorders. Timely recognition in this vast field of faulty behavior is the basis of preventive mental hygiene.

The importance of surrounding child adoption and the placement of dependent children with adequate clinical safeguards indicates another field for more systematic developmental diagnosis.

From the standpoint of medical research it is also desirable that more accurate observations should be made concerning the course and the symptoms of development in various diseases. The developmental history of hospital and dispensary case records ordinarily is scanty and incomplete.

Among the infant cases which come to necropsy there are many who should receive the careful investigation of the neuropathologist. But again the significance of his findings hinges in no small measure on the detail of the antecedent developmental diagnosis. The behavior picture and the histologic picture must be brought into correlation.

We need to learn vastly more regarding the developmental back strokes and sequelae of disease in the living subject. We can only learn this by making more consistent and recurrent records of the developmental status of all patients who are under careful medical observation.

The pediatrician has already adopted the developmental point of view in relation to the basic problem of nutrition. The supervision of nutrition in infancy has become the central concern of pediatrics, and here the pediatrician maintains a balanced interest in disease and in normal development. His attitude and his technic in this field constitute perhaps the most significant advance which has been made in preventive medicine.

The consecutive oversight of the nutritional health of the child is the natural nucleus for a more inclusive type of developmental diagnosis and supervision.

RESULTS OF SULPHARSPHENAMIN THERAPY IN CONGENITAL SYPHILIS. Presented by DR. PHILIP H. SYLVESTER.

Dr. Sylvester reported the treatment of sixty-four cases of congenital syphilis by sulpharsphenamin, which was injected intramuscularly with a dosage of 10 to 20 mg. per pound of body weight. A roentgenogram showed that early bone defects disappeared before the periosteum returned to normal.

* The norms of development and their diagnostic applications are described in the author's volume: The Mental Growth of the Preschool Child. A Psychological Outline of Normal Development, Including a System of Developmental Diagnosis. New York: The Macmillan Company, 1925, pp. 447.

DISCUSSION

DR. BLACKFAN: I understand in the early cases that the lesions healed much more rapidly than in the older children. If so, is there any way by which we could make these children come to us for special treatment?

GASTRIC ANALYSIS IN NEW-BORN INFANTS. Presented by DR. ALFRED T. SHOHL.

The gastric contents of unfed new-born infants consists of gastric juice which contains free hydrochloric acid. The average p_H is 2.6. The buffer value is 9.4 c.c. The volume is 4.5 c.c. At 5 days of age, test meals removed after one hour show an average acidity of p_H 2.5, a buffer value of from 10 to 12 c.c. and a volume of 6.5 c.c. Similar values were obtained on the tenth day. A capacity for gastric digestion is greater in new-born infants than later in infancy. Gastric digestion of 50 c.c. of partly skimmed cow's milk is practically complete in one hour. It would seem logical to feed new-born infants a more concentrated and more alkaline food.

CHICAGO PEDIATRIC SOCIETY

Clinical Meeting, April 21, 1925

HENRY W. CHENEY, M.D., *President*

HODGKIN'S DISEASE. Presented by DR. SANFORD.

The patient was a boy, aged 8 years, whose chief complaint was progressive weakness and pallor, loss of weight, and general adenopathy. He had been admitted one year previously and a diagnosis of Hodgkin's disease had been made, but the parents refused treatment and took him to another hospital where a diagnosis of tuberculosis was made. As this diagnosis did not suit them, the boy was readmitted to the hospital where sections were made and the original diagnosis was confirmed. He was given an injection of 250 c.c. of whole blood intravenously and had no reaction. He felt well, the hemoglobin rose rapidly and he left the hospital at the end of eight days. The boy has since been seen at monthly intervals and has shown progressive improvement.

DISCUSSION

DR. HENRY CHENEY asked what the present hemoglobin was.

DR. SANFORD said it had risen from 28 to 65 and that the boy had gained 10 pounds (4 kg.) in three months.

HODGKIN'S DISEASE. Presented by DR. MILLER.

The patient, a boy, aged 11 years, had first been seen by Dr. Miller in 1922, when he presented a localized involvement of the cervical glands on the left side, which had been present for about five years. The glands were then about the size of a small orange, having enlarged in three months from the size of a small walnut to that size. A resection was done and sections showed typical Hodgkin's disease. One or two treatments with roentgen ray were given in the following month. The patient was seen again one and a half years later, when he returned with a recurrence in the same area but not so large as before, and

a second resection was done. There has been no apparent recurrence since. A series of about eight roentgen-ray treatments had been given since 1922. Dr. Miller then showed roentgen-ray films and lantern slides of a typical case of Hodgkin's disease in an adult, who had apparently been cured by the use of roentgen-ray therapy and sunlight.

ROUND CELLED SARCOMA OF THE JAW. Presented by DRS. SCHAFFER and DEWEY.

The patient, a boy, aged 12 years, with tuberculosis of the hip of long standing, complained of pain and swelling in the gum following the extraction of a first molar, two days previously. There was a mass present about the size of a small walnut and on the patient's return five days later this had progressed until it involved the second molar. The boy also complained at this time of inability to urinate, and presented a greatly distended bladder and an enlarged prostate. The inguinal glands were not enlarged but several subcutaneous nodules, the size of a pea, were present. The mass from the gum was excised and sections showed a giant celled sarcoma. The boy then went to the County Hospital where an examination showed no bladder changes but an operation on the prostate was advised and done. The boy did well until the twelfth day after operation when the temperature rose to 103 F., and bronchopneumonia developed. He died twenty days after the operation and forty-eight days after the onset of the trouble. Sections from the prostate also revealed round celled sarcoma.

A pathologic report, illustrated with lantern slides, was given in connection with this case by Dr. Dewey.

COLLABORATIVE HEALTH SURVEY OF SCHOOL CHILDREN. Presented by DR. STULIK.

The report of the findings in 450 children in a parochial school was given. This work was carried out under the auspices of the Chicago Association for Prevention and Relief of Heart Disease. The work was done with the cooperation of an ophthalmologist, otologist, laryngologist, dentist, internist, orthopedist, pediatrician, psychiatrist and cardiologist. Many interesting facts were given.

THE VAN DEN BERGH TEST FOR ICTERUS. Presented by DR. MEBANE.

A child, aged 1 year, with icterus since birth was presented and the results of the van den Bergh test in this case were explained. The technic used was outlined and the cases were grouped. A direct reaction was supposed to be due to the type of bile which is present as the result of mechanical obstruction; the indirect reaction was found where no such mechanical obstruction existed, such as in cases of icterus neonatorum, but the evidence presented did not support this view.

DISCUSSION

DR. JOSEPH BRENNEMANN asked if the child had an enlarged liver.

DR. GRULEE said that the liver and spleen were both enlarged and varied in size.

DR. BRENNEMANN asked the color of the urine.

DR. GRULEE said that it was typically icteric and that the stools were white. Accurate history was hard to get as the child was not born in the city, but the doctor who delivered the child told the foster parents that the child had been jaundiced from birth.

THE DICK TEST FOR SCARLET FEVER. Presented by DR. GLADYS DICK.

Several children with skin reactions following the administration of the Dick test for scarlet fever were presented by Dr. Dick. She explained that the technic is exacting, for the range between negative and positive reactions was slight. The dose is exactly 0.1 c.c. of the skin test solution and a one-half to three-fourth inch needle should be used. The site should be on the flexor surface of the forearm at the junction of the upper and middle thirds. The reaction must be observed not earlier than twenty-two or later than twenty-four hours after administration.

DISCUSSION

DR. HENRY CHENEY asked if the treatment was available for all or if they could care for all patients sent them.

DR. DICK replied that they were glad to give all they could, but that as yet they could recommend no commercial substance.

A CASE OF OXYCEPHALY. Presented by DR. PARMALEE.

The baby, born in hospital four weeks ago, was the first child, of full term pregnancy, with a birth weight of 4 pounds 5 ounces. The child had done moderately well and evidently the condition was just beginning, although it showed a characteristic tower head.

DISCUSSION

DR. JOSEPH BRENNAMANN asked if there was increased pressure in the fontanels.

DR. PARMALEE said apparently not.

PRESENTATION OF PATHOLOGIC SPECIMENS. Presented by DR. APFELBACH.

The first specimen shown was from a case of congenital syphilis with congenital myocarditis. Specimens of pyloric stenosis, from a baby, aged 3 months, who died a week after a Ramsted operation, showed recurrent obstruction of the pylorus with fibrous adhesions between the stomach and liver. A glioma of the pons (acellular) was shown and a case of congenital absence of the lungs in a full term child, who died shortly after delivery. The heart was found to occupy three quarters of the chest.

HYDROCEPHALUS IN A MONGOLIAN IDIOT. Presented by DR. GRULEE.

The patient was a small girl, aged 4 months, who presented all the typical signs of mongolism with congenital hydrocephalus. The Dandy phenolsulphonephthalein test showed that it was not only a congenital hydrocephalus but also a communicating one. Dr. Grulee stated that he had not had an opportunity to look up the literature but that he thought this was a rare combination.

INTRAPERITONEAL INJECTION OF NEOARSPHENAMIN. Presented by DRS. SANFORD and NOBLE.

Dr. Sanford reported on a series of ten cases of congenital syphilis, in which the infants had all been treated by intraperitoneal injection of neoarsphenamin, and Dr. Noble gave the results obtained in a series of thirty-eight animal experiments. They urge this form of administration in infants, in whom conditions require speed of reaction.